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64TH CONGRESS, 1st Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1008.

WATERWAY FROM LAKE SUPERIOR TO THE MISSISSIPPI RIVER.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT ON PRELIMINARY EXAMINATION FOR WATERWAY FROM LAKE SUPERIOR TO THE MISSISSIPPI RIVER BY WAY OF ALLOUEZ BAY, AT THE EASTERLY END OF THE DULUTH-SUPERIOR HARBOR, AND THE AMNICON, MOOSE, AND ST. CROIX RIVERS, MINN. AND WIS.; ALSO A REPORT BY THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS, REVIEWING SAID REPORT, AND ALSO SUBMITTING ITS VIEWS IN COMPLIANCE WITH A RESOLUTION OF THE COMMITTEE ON RIVERS AND HARBORS OF THE HOUSE REQUESTING THE BOARD TO REEXAMINE REPORT PRINTED IN HOUSE DOCUMENT NO. 304, SIXTY-FIRST CONGRESS, SECOND SESSION.

APRIL 8, 1916.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, April 6, 1916.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated 4th instant, together with copy of a report from a special board of officers of the Corps of Engineers, dated May 14, 1913, on preliminary examination of waterway from Lake Superior to the Mississippi River, made in compliance with the provisions of the river and harbor act approved July 25, 1912; also copy of report by the Board of Engineers for Rivers and Harbors, dated November 9, 1915, made in compliance with a resolution of the Committee on Rivers and Harbors of the House of Representatives requesting the board to reexamine the report on the preliminary examination of this waterway.

Very respectfully,

NEWTON D. BAKER,
Secretary of War.

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WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, April 4, 1916.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination of waterway from Lake Superior to the Mississippi River.

1. There is submitted herewith for transmission to Congress report dated May 14, 1913, by a special board of officers of the Corps of Engineers, on preliminary examination authorized by the river and harbor act approved July 25, 1912, of waterway from Lake Superior to the Mississippi River by way of Allouez Bay, at the easterly end of the Duluth-Superior Harbor, and the Amnicon, Moose, and St. Croix Rivers, Minn. and Wis.; also a report by the Board of Engineers for Rivers and Harbors, dated November 9, 1915, reviewing the report of the special board, and also submitting its views in compliance with a resolution of the Committee on Rivers and Harbors of the House of Representatives requesting the board to reexamine the report on preliminary examination of canal connecting Lake Superior and the Mississippi River by way of the St. Croix River, Minn. and Wis., printed in House Document No. 304, Sixty-first Congress, second session.

2. In the report referred to in the resolution the route by way of Allouez Bay, Brule, and St. Croix Rivers, was considered most feasible, but the conclusion was reached that it was not advisable for the General Government to undertake the construction of the proposed waterway. This route and the one specified in the act of July 25, 1912, are identical from Allouez Bay to the Amnicon River and from the mouth of the Moose to the Mississippi River. The Amnicon-Moose River route, however, has a summit level about 214 feet higher than the other, or 428 feet of additional rise and fall, corresponding to the lift of about 20 locks. Moreover, the special board finds that the water supply by this route is insufficient for a barge canal, and it therefore expresses the opinion that it is not advisable to construct a canal by this route. In reference to the construction of a waterway by way of Brule and St. Croix Rivers, reconsideration of which is authorized by the resolution of the Committee on Rivers and Harbors, the special board discusses the benefits to be expected and the advantages and disadvantages of such a canal as compared with rail transportation under the conditions existing at this locality. It reaches the conclusion that the proposed canal by way of St. Croix River is not now feasible and practicable, considering the necessary location, plans, cost of construction, commerce affected, and water supply.

3. The Board of Engineers for Rivers and Harbors, to whom this report has been referred, concurs in the views of the special board, and expresses the opinion that it is not advisable for the United States to undertake the construction of this waterway at the present time by either of the routes considered.

4. After due consideration of the above-mentioned reports, I concur in the views of the special board and the Board of Engineers for Rivers and Harbors, and therefore report that the construction by the United States of a canal or waterway from Lake Superior to

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the Mississippi River, either by way of Allouez Bay, at the easterly end of the Duluth-Superior Harbor, and the Amnicon, Moose, and St. Croix Rivers, or by way of Allouez Bay, Brule, and St. Croix Rivers, is not deemed advisable at the present time.

W. M. Black,
Chief of Engineers, United States Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

War Department,
The Board of Engineers for Rivers and Harbors,
Washington, D. C., November 9, 1915.

From: The Board of Engineers for Rivers and Harbors.
To: The Chief of Engineers, United States Army.
Subject: Report relative to waterway from Lake Superior to the Mississippi River.

1. The following is submitted in review of the report of a special board on preliminary examination submitted in compliance with the following item of the act of July 25, 1912:

> Waterway from Lake Superior to the Mississippi River by way of Allouez Bay, at the easterly end of the Duluth-Superior Harbor, and the Amnicon, Moose, and St. Croix Rivers, Minn. and Wis.,

also, in compliance with a resolution of the House of Representatives dated January 13, 1913, as follows:

> *Resolved by the Committee on Rivers and Harbors of the House of Representatives, United States,* That the Board of Engineers for Rivers and Harbors created by section three of the river and harbor act approved June thirteenth, nineteen hundred and two, be, and it is hereby, requested to reexamine the report on a preliminary examination of canal connecting Lake Superior and the Mississippi River by way of the Saint Croix River, Minnesota and Wisconsin, printed in House Document Numbered Three hundred and four, Sixty-first Congress, second session, and report thereon.

2. The report referred to in the resolution was submitted under the act of March 3, 1909. The route considered therein as most feasible was by way of Allouez Bay, Brule and St. Croix Rivers. The report was unfavorable. The route to be considered under the act of 1912 is by way of Allouez Bay, Amnicon, Moose, and St. Croix Rivers. The routes are identical from Allouez Bay to the Amnicon River and from the mouth of the Moose to the Mississippi River. By the new route, the elevation of the summit level is found to be 630 feet above Lake Superior and 565 feet above the Mississippi River at the mouth of the St. Croix, a total rise and fall to be overcome of 1,195 feet, as compared with a summit level of 416 feet above Lake Superior and 351 feet above the Mississippi River, a total rise and fall of 767 feet by the Brule-St. Croix route. This makes a difference in favor of the latter route of about 214 feet in elevation, or 428 feet of rise and fall, which would correspond to the lift of about 20 locks. The special board also finds that the water supply by the Amnicon-Moose River route is insufficient for a barge canal.

3. In view of these facts, the special board reports that it is not advisable to construct a canal by the Amnicon-Moose River route specified in the act of 1912. In this view the Board of Engineers for Rivers and Harbors concurs.

4. The resolution opens up again the question of the advisability of constructing a canal by way of the Brule-St. Croix route, as considered in the report published in House Document No. 304, Sixty-first Congress, second session.

5. The special board considers 3 types of canals, having depths and bottom widths as follows: 21 feet by 92 feet, 7 feet by 100 feet, and 7 feet by 59 feet, all with termini at the cities of Duluth and Superior, on Lake Superior, and St. Paul and Minneapolis, on the Mississippi River. As the investigations indicate an inadequate water supply for the largest size, a doubtful supply for the intermediate size, but sufficient for the smallest size, further discussion is confined to the latter, with a depth of 6 feet, however, to correspond with the project depth of the Mississippi River from the mouth of the St. Croix to St. Paul and Minneapolis. This is the canal considered in the report under review, the estimated cost of which was $7,815,000. The estimate of annual cost is $420,000, which includes operation, maintenance, and 3½ per cent interest on first cost.

6. The special board finds an estimated present tonnage by rail, between Duluth-Superior and the Twin Cities, and moved into and out of the eight counties along the canal, as follows:

	Tons.
Soft coal	1,724,000
Hard coal	658,200
Iron and steel	2,400
Flour	251,400
Grain	329,500
General merchandise	329,500
Total	3,295,000

The amount that would be carried by the canal if constructed is purely speculative. In 1880 the Erie Canal carried about 4,600,000 tons, and in 1906 2,300,000 tons, the latter being about 3 per cent of the total tonnage between Buffalo and New York.

7. An analysis of the cost of transportation by the canal, both to the United States and to the carrier, is given as determined under various assumptions. The cost to the United States under the improbable assumption that the canal will carry all the commerce between the Twin Cities and Duluth-Superior, would be 13 cents per ton, while on the assumption that it would carry 3 per cent of the total freight, as in the case of the Erie Canal in 1906, the cost to the United States would be $4.25 per ton. On the basis of carrying 18 per cent of the entire freight, a very liberal assumption, the cost would be 71 cents per ton. The cost to the carrier, based on Erie Canal experience, would be 78 cents per ton, making the total cost in the latter case $1.49. The average rail rate on all commodities between the canal termini is about $1.02, showing a probable difference in favor of the railroads of about 47 cents per ton. The special board states that it may be claimed that the total freight will increase and lessen this discrepancy, but it calls attention to the fact that between 1880 and 1906 the actual tonnage carried by the Erie Canal declined from 18 to 3 per cent of the total between Buffalo and New York, while the total tonnage actually increased 200 per cent.

8. The special board considers each commodity that may be expected to use the canal, the probable cost of its transportation by canal and by rail, and concludes that practically in every case the advantages are in favor of the railroads.

9. Based upon its investigations and studies, the special board concludes that the proposed canal connecting Lake Superior and the Mississippi River by way of the St. Croix River is not now feasible and practicable, considering the necessary location, plans, cost of construction, commerce affected, and water supply.

10. Parties in interest were duly informed of the unfavorable report of the special board and given an opportunity of submitting statements and arguments bearing upon the subject to the Board of Engineers for Rivers and Harbors. This resulted in a request for a hearing, which was given at this office on June 30, 1914, and was attended by several members of Congress and a delegation of citizens representing the States of Minnesota and Wisconsin. In addition to oral statements made, a printed appeal containing data and representing the views of the Minnesota and Wisconsin Canal Commissions was presented. At a later date, a supplemental statement, also printed, was received.

11. The State Canal Commissions differ from the special board in some of its figures bearing upon the probable cost of transportation by the canal, the cost of handling coal at the terminals and its consequent depreciation, and in some other respects. The views of the commissions were brought to the attention of the special board, which submitted further observations in reply thereto and stated that it saw no reason to modify or change its figures or recommendations. The matters in dispute are obviously incapable of precise determination, but careful consideration leads this board to believe that the figures and estimates of the special board are reasonable and not far from the facts.

12. The question of the advisability of constructing this canal was carefully considered in the report now under review. Physical and commercial conditions present and prospective were then fully discussed and the conclusion was reached that the United States would not be justified in undertaking the work. An examination of the further data now available, including the discussions of the special board and the elaborate analysis submitted by the State Canal Commissions, fails to indicate any material change in these conditions or any sufficient reason for changing the views then expressed. The board does not believe that a light-draft canal operating only about seven months in the year would divert sufficient commerce from the existing well-established lines of transportation to warrant the great cost of construction and maintenance and operation. Reference to the former reports shows that the estimate of cost for this waterway is based on insufficient data, and it is believed by the special board, as well as by the Board of Engineers for Rivers and Harbors, to be too low. Inasmuch as the inadvisability of investing even this estimated amount in the proposed improvement is evident to the board, the expenditure of the sum necessary for a new survey to obtain a more reliable estimate is not recommended.

13. In view of the foregoing, the board concurs with the special board in the opinion that it is not advisable for the United States to undertake the construction of this waterway at this time.

14. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other related subjects which could be coordinated with the suggested improvement in such manner as to render the work advisable in the interests of commerce and navigation.

For the board.

W. M. Black,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF WATERWAY FROM LAKE SUPERIOR TO THE MISSISSIPPI RIVER.

United States Engineer Office,
Duluth, Minn., May 14, 1913.

From: Board of Engineer Officers.
To: Chief of Engineers, United States Army.
Subject: Preliminary examination of waterway, Lake Superior to the Mississippi River.

1. The board of officers of the Corps of Engineers, constituted by Special Orders No. 19, War Department, Office of the Chief of Engineers, Washington, August 14, 1912, for the purpose of making a preliminary examination and report thereon for a waterway from Lake Superior to the Mississippi River by way of Allouez Bay, at the easterly end of the Duluth-Superior Harbor, and the Amicon, Moose, and St. Croix Rivers, Minn. and Wis., met January 14, 1913, at Duluth, Minn., on the call of the senior member; held a public hearing on January 15; and adjourned on the 16th to await further promised information. The Board again assembled on May 14, 1913, at St. Paul, Minn., considered further matters, made its report, and adjourned sine die.

2. The board submits the following report:

3. The river and harbor act of July 25, 1912, provides for the following preliminary examination:

> Waterway from Lake Superior to the Mississippi River by way of Allouez Bay, at the easterly end of the Duluth-Superior Harbor, and the Amicon, Moose, and St. Croix Rivers, Minn. and Wis.

4. *Previous reports.*—Three reports have previously been submitted on the question of a waterway from Lake Superior to the Mississippi River.

5. The river and harbor act of August 17, 1894, contained the following clause:

> For examination and survey for the location of a canal connecting Lake Superior and the Mississippi River, $10,000; and the engineers making said examination and survey shall report the most feasible route for such canal, either by way of the Saint Croix, Rum, or Upper Mississippi Rivers: *Provided*, That nothing herein shall be construed to commit the Government to proceed with the construction of said improvement.

6. This duty was assigned to Maj. Sears, Corps of Engineers, whose report is published in House Document No. 330, 54th Congress, 1st session, and also as Appendix HH 12, Report of the Chief of Engineers, 1896. In compliance with the wording of the law, which precluded an opinion as to whether the improvement was commercially

justifiable or actually feasible, Maj. Sears confined himself to the question of relative feasibility and reported that the most feasible route for a canal connecting Lake Superior and the Mississippi River is from Allouez Bay via the Brule and St. Croix Rivers.

7. The river and harbor act of March 3, 1899, contained the following clause:

> Lake Superior and Mississippi River: The report upon the examination and survey for the location of a canal connecting Lake Superior and the Mississippi River, provided for by the river and harbor act of eighteen hundred and ninety-four-shall be supplemented by a further report as to whether such canal is feasible and an improvement which should be undertaken by the Government, and, if feasible, the probable cost of construction, operation, and maintenance of the same.

8. This duty was also assigned to Maj. Sears, whose report, supplemental to the preceding one, is published in House Document No. 69, 56th Congress, 1st session, and also as Appendix KK 10, Report of the Chief of Engineers, 1900. His conclusion, concurred in by the division engineer and the Chief of Engineers, was that the improvement was not one which should be undertaken by the Government.

9. The river and harbor act of March 3, 1909, contained the following clause:

> The report upon the examination and survey for the location of a canal connecting Lake Superior and the Mississippi River by way of the Saint Croix River, as provided by the river and harbor act of eighteen hundred and ninety-four and as suppplemented by the provisions of the river and harbor act approved March thirty-first, eighteen hundred and ninety-nine, shall be completed by a further report as to whether existing conditions render such project now feasible and practicable, considering the necessary location, plans, cost of construction and maintenance, commerce affected, and water supply.

10. The report on this subject was submitted by Lieut. Col. G. D. Fitch, Corps of Engineers, under date of August 30, 1909, and is printed in House Document No. 304, Sixty-first Congress, second session.

11. The conclusions of the district engineer were as follows:

> In view of the existence of four competing lines of railroad between the termini, of the longer route and much longer time of transit for freight, of the shortness of the navigation season, of the high cost of construction and maintenance, of the very limited amount of probable local traffic, and of the uncertainty of any through traffic on the canal if built, I am of the opinion that its construction is not worthy of being undertaken by the General Government.

12. Those of the Board of Engineers for Rivers and Harbors:

> Answering the questions propounded in the act the board reports that in its opinion, while existing conditions render such a project feasible and practicable from an engineering point of view, the canal is impracticable from a commercal viewpoint, when consideration is given to location, plans, cost of construction and maintenance, commerce affected, and water supply, and therefore it is not advisable for the General Government to undertake the work.

13. And those of the Chief of Engineers:

> I concur with the district officer, the division engineer, and the Board of Engineers for Rivers and Harbors that, while existing conditions render such a project practicable, from an engineering point of view, it is commercially impracticable, and that it is not now advisable for the General Government to undertake the work.

14. The first act provided for finding the most feasible route from Lake Superior to the Mississippi River without considering its worthiness. The second act provided for an examination as to whether or not the selected route was feasible from a commercial

standpoint. It was held not to be. The third act provided for a resubmission of the case under possible changed conditions. It was still held to be unworthy.

15. *Outline.*—The act requiring the present report confines the scope of the board to a modification of the Brule-St. Croix route which had been previously reported as most feasible. This modification consists in following the route via Allouez Bay, the Amnicon and Moose Rivers to the St. Croix in place of the Brule and upper St. Croix Rivers. Both routes follow the same line from Allouez Bay to the Amnicon River and from the mouth of the Moose River to the Mississippi River. Attention is invited to the accompanying map and profile and particularly to report (Appendix A) of Junior Engineer G. A. Taylor, who was in charge of the field party gathering information and data for the new portion of the route. Some of the conclusions stated are taken from Mr. Taylor's report direct.

16. *Description of the route.*—Beginning at the eastern end of Allouez Bay in Duluth-Superior Harbor; thence for a distance of 5½ miles in an easterly direction to the Amnicon River, at an elevation of 61 feet; thence for 14½ miles up the Amnicon River to a point 582 feet above Lake Superior; thence for 6 miles south across the divide, which is 630 feet above Lake Superior, to the Moose River; thence 9 miles down the Moose to the St. Croix River, 385 feet above Lake Superior; and thence down the St. Croix for 149½ miles to its junction with the Mississippi River, 65 feet above Lake Superior.

17. The total rise from Lake Superior to the summit is 630 feet, and this point is 565 feet above the Mississippi at the mouth of the St. Croix, making a total rise and fall of 1,195 feet to be overcome between Lake Superior and the Mississippi River.

18. *Water supply.*—By reason of its primary importance the question of water supply for the summit level of the proposed canal was given particular attention.

19. The examination by Mr. Taylor, fully described in his accompanying report with maps[1] and profile, shows the summit level for the crossing from the Amnicon to the Moose River, to have an available watershed of only 65 square miles sufficient with average rainfall to furnish a flow of 93 second-feet for six months in the year. A recent investigation of the run-off of the whole St. Croix Valley above St. Croix Falls shows that for a year of practically normal rainfall (the discharge being measured continuously by the electrical power generated) there was 22.6 per cent run-off. This, with Mr. Taylor's estimate of 30 inches rainfall, would amount to 6¾ inches instead of his 0.8 foot, showing that his figure is not too small.

20. Outside this limited watershed the land slopes away, and no opportunity was found for a feeder to augment the summit supply. The summit is about 200 feet above the headwaters of the St. Croix on the east, and 50 to 70 feet above the Black River on the west. By a computation similar to that followed on pages 13 to 18, House Document No. 330, Fifty-fourth Congress, first session, it is found that the summit level water supply for a barge canal must be 210 second-feet, if 40 lockages are made per day. Mr. Taylor estimates the available supply at 93 second-feet, and that is probably large.

[1] Only one map and profile printed.

WAR DEPARTMENT.

CORPS OF ENGINEERS, U S. ARMY.

LAKE SUPERIOR AND MISSISSIPPI CANAL

By the Amnicon Moose and St. Croix Route

Scale of Miles

10 5 0 10 20 30 40

Prepared under the direction of the Board constituted by Par. 7, S.O. 19, War Department, Washington, August 14, 1912.

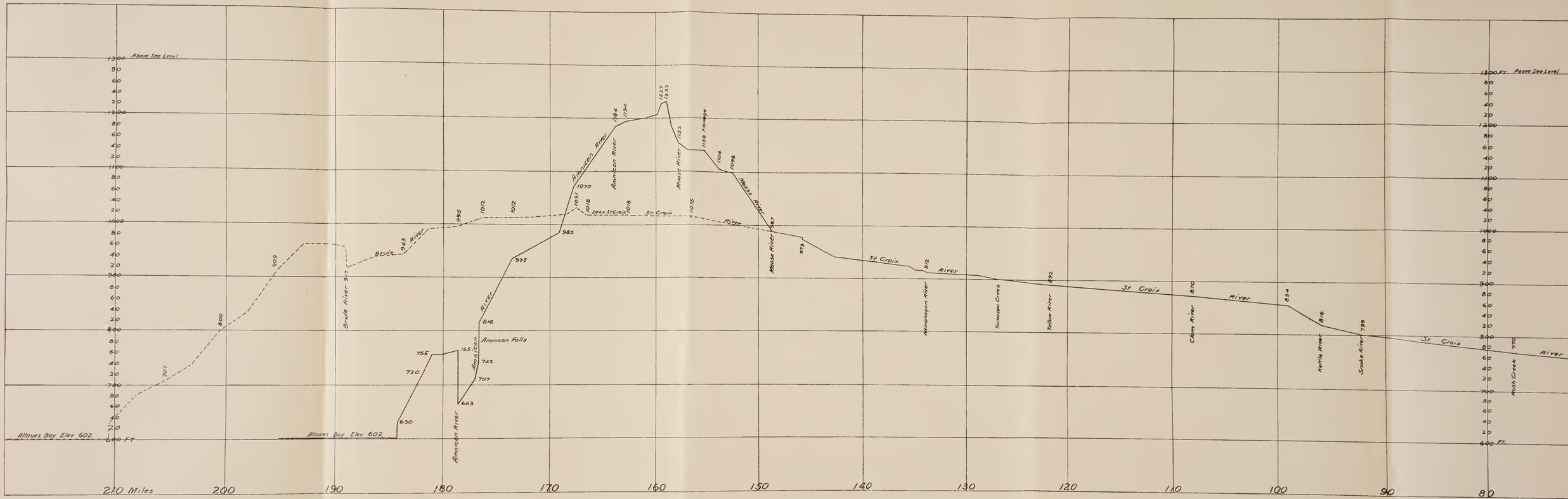
By

G. A. Taylor, Junior Engineer and
Chas. Carisch, Jun. Engr. Draftsman

THE NORRIS PETERS CO., WASHINGTON, D. C

House Doc. No. 1008; 64th Cong., 1st Sess.

WAR DEPARTMENT.



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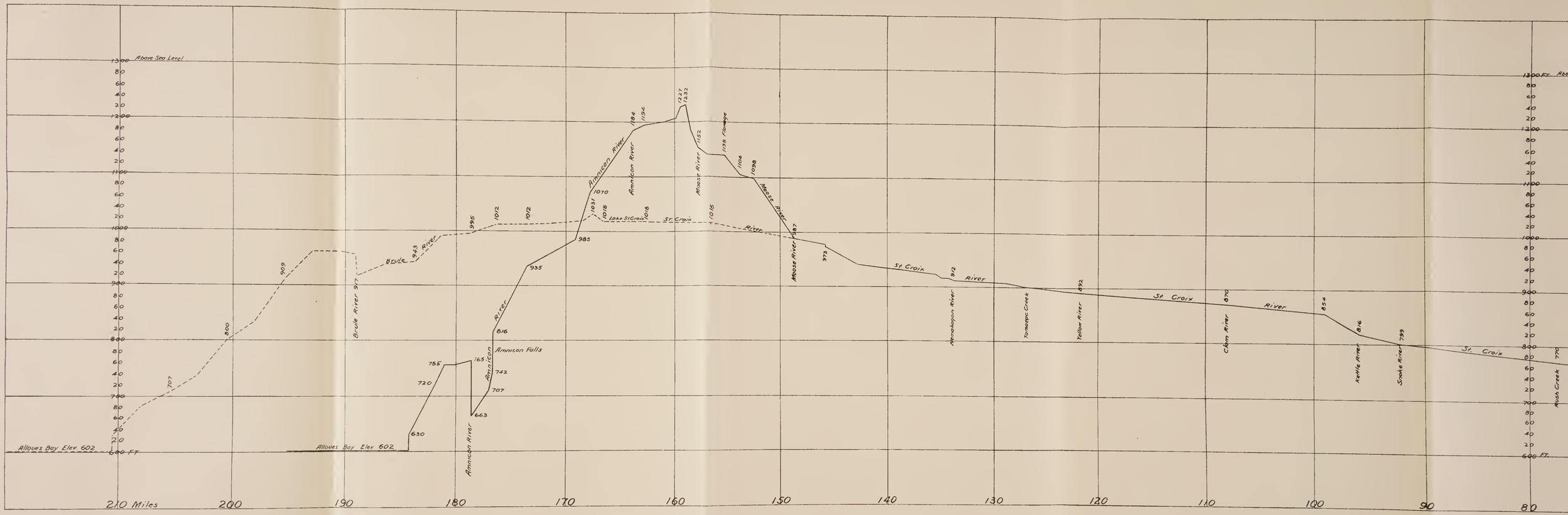
WAR DEPARTMENT.



THE NORRIS PETERS CO., WASHINGTON, D. C.

PRELIMINARY EXAMINATION

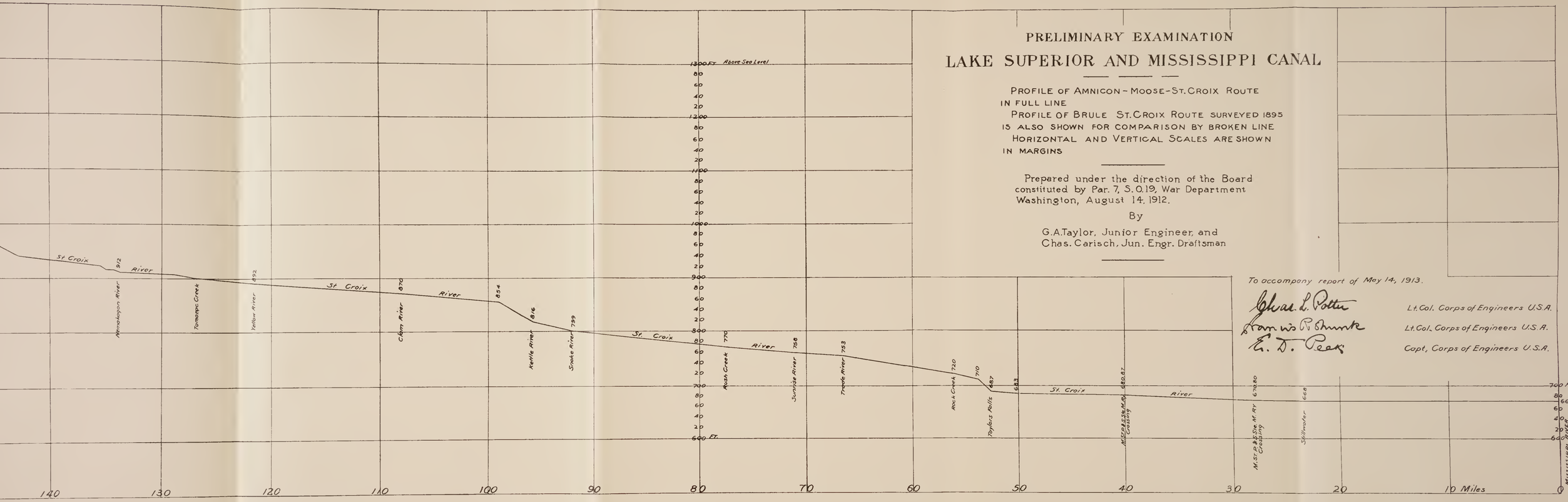
LAKE SUPERIOR AND MISSISSIPPI CANAL

PROFILE OF AMNICON - MOOSE - ST. CROIX ROUTE
IN FULL LINE
PROFILE OF BRULE ST. CROIX ROUTE SURVEYED 1895
IS ALSO SHOWN FOR COMPARISON BY BROKEN LINE
HORIZONTAL AND VERTICAL SCALES ARE SHOWN
IN MARGINS

Prepared under the direction of the Board
constituted by Par. 7, S.O.19, War Department
Washington, August 14, 1912.

By

G.A.Taylor, Junior Engineer, and
Chas. Carisch, Jun. Engr. Draftsman



To accompany report of May 14, 1913.

Chas. L. Potter — Lt. Col. Corps of Engineers U.S.A.

Francis R. Shunk — Lt. Col. Corps of Engineers U.S.A.

E. D. Peek — Capt. Corps of Engineers U.S.A.

21. *Conclusion.*—The board therefore feels justified, without further discussion, in stating the following facts and conclusions:

(*a*) A feasible route from the engineering standpoint had already been found for a canal connecting Lake Superior and the Mississippi River via the Brule and St. Croix Rivers.

(*b*) The route prescribed in the act of July 25, 1912, adds the difficulty of about 210 feet additional height of summit level, calling for probably 20 more locks.

(*c*) The Amnicon and Moose Rivers carry much less water than the Brule and upper St. Croix and therefore the possible water-power development would be smaller.

(*d*) The Amnicon River is much less favorable to canalization than the Brule. (See Appendix A.)

(*e*) Even with a limited use of the canal (40 lockages per day) the natural water supply available to the summit level is not half enough, and to provide the necessary water, expensive pumping plants must be furnished and operated.

(*f*) The small local population which could be benefited by the canal is along the Brule and St. Croix rather than along the Amnicon and Moose.

(*g*) The only advantage to offset these disadvantages is a reduction in length of $25\frac{1}{2}$ miles.

(*h*) The disadvantages far outweigh the advantages.

(*i*) The route specified in the act is not feasible from an engineering standpoint.

(*j*) The locality in question is not worthy of improvement by the General Government.

22. The Committee on Rivers and Harbors of the House of Representatives passed on January 13, 1913, the following resolution:

Resolved by the Committee on Rivers and Harbors of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors created by section three of the river and harbor act approved June thirteenth, nineteen hundred and two, be, and it is hereby, requested to reexamine the report on a preliminary examination of canal connecting Lake Superior and the Mississippi River by way of the Saint Croix River, Minnesota and Wisconsin, printed in House Document Numbered three hundred and four, Sixty-first Congress, second session, and report thereon.

23. On January 23, 1913, the Chief of Engineers referred the resolution to this board for consideration and report. This is assumed to open up the whole question of advisability of a canal connecting Lake Superior with the Mississippi River via the Brule and St Croix Rivers.

24. *Route.*—The route to be considered is that via the Brule and St. Croix Rivers and described in House Document No. 304, Sixty-first Congress, second session, as follows:

By this route the northern terminus of the proposed waterway is Bear Creek on Allouez Bay, the southeasterly portion of Duluth-Superior Harbor. Thence for a distance of 21.58 miles in an east-southeasterly direction there is a canal link to the Brule River 356 feet above Lake Superior. The canalized Brule River is then followed for 10 miles to the summit level, which is 416 feet above Lake Superior and 351 feet above the Mississippi at the mouth of the St. Croix. This level follows the general direction of the Brule River and finally, through a short excavated trench, reaches upper Lake St. Croix. 12.73 miles from the north summit lock. About 20.77 miles below the northerly end of upper Lake St. Croix is the south summit lock. Thence the route is along the canalized St. Croix River for about 17 miles to a point about one-half

mile below its confluence with the Namakagan River. Thence slack-water navigation is proposed for the St. Croix River and St. Croix Lake to the southern terminus, Point Prescott on the Mississippi River, 30 miles below St. Paul, except that two short canal links will be required, one 5 miles long around Kettle Rapids and one 8,000 feet long at Taylors Falls. The total length of the waterway by this route is 210 miles, and the total lift (up and down) is 767 feet. This may safely be considered the most feasible route; otherwise another survey would be required, and it is not probable that such survey would result in the recommendation of any material change in the location of the canal.

25. *Size of canal.*—Three kinds of canal have been considered—a ship canal, a steamboat canal, and a barge canal. One of the most important considerations in a canal is the supply of water to the summit level which is drawn upon for operation whenever lockages are made, and by evaporation, leakage, and filtration at all times. A careful discussion of the water available to the summit level of this canal was made by Lieut. C. H. McKinstry, Corps of Engineers, in 1895, and published as Exhibit H of report of Maj. Sears in House Document No. 330, Fifty-fourth Congress, first session. The conclusion was reached that the summit level supply was entirely inadequate for a ship canal, probably inadequate for a steamboat canal, but sufficient for a barge canal of the dimensions suggested.

26. At the public hearing January 15, 1913, many depths were suggested—8, 10, 12, and 14 feet. The junction of this canal with the Mississippi River can not be considered as in any sense its commercial terminus. At that point is the small town of Prescott, Wis. (population about 1,000), and a few miles up the river the town of Hastings, Minn. (population about 4,000). Neither of these is likely to become a large railroad center. The object of the canal is to obtain through water transportation from Lake Superior to St. Paul and Minneapolis and to points lower down on the Mississippi River. The existing project for navigation of the Mississippi River from Minneapolis to St. Louis provides for 6 feet at low water, and there is little prospect of any increase in this project depth. It can scarcely be argued that a transshipment would be made at Duluth from lake vessels (for which no canal can be built on account of lack of water at the summit level) to deep-draft barges for the canal, and another transshipment at Prescott to the shallow barges which must finish the trip to any large market or center of population.

27. It should thus be definitely settled that a ship canal from Lake Superior to the mouth of the St. Croix River is out of the question, and that, for any future time which the board considers within reason, the depth for a canal should be that now fixed by the upper Mississippi River project, or 6 feet, and no more.

28. It then becomes a question between a steamboat canal and a barge canal. With the water supply at the summit level very doubtful for a steamboat canal, and with no estimate of the cost of such a canal, the discussion will be primarily confined to a barge canal of 6 feet depth, with 16 locks and 8 hydraulic lifts, 59 feet bottom width, and 80 feet top width, and locks 170 by 35 feet with 6 feet of water on the miter sills. This is the canal discussed in House Document No. 304, Sixty-first Congress, second session.

29. *Cost.*—Such a canal was estimated in 1909 to cost $7,815,000 for construction, and $420,000 per year for operation, maintenance,

and 3½ per cent on investment. There is certainly no change in conditions in the past three and one-half years which would warrant a reduction in these estimates. They will be accepted, but if any doubt exists it must be as to their being high enough.

30. *Problem.*—Will the saving in freight to the public, on the probable commerce through the canal be equal to the $420,000 annual expense to the Government for operation, maintenance, and interest on the investment?

31. *Prospective commerce.*—At the request of the board the Minnesota Railroad and Warehouse Commission has furnished statistics of the amount of such material as might go by water, hauled during the year ending June, 1912, by the four railroads connecting Duluth-Superior with Minneapolis and St. Paul.

Name of road.	Hard and soft coal and structural iron shipped from Duluth, Minn., and Superior, Wis., to St. Paul, Minn. Transfer and Minneapolis.	Flour shipped from St. Paul, Minn. Transfer and Minneapolis, to Duluth, Minn., and Superior, Wis.
	Short tons.	*Short tons.*
Great Northern Railway Co	694,115	106,570
Northern Pacific Railway Co	1,089,105	112,330
Chicago, St. Paul, Minneapolis & Omaha Railway Co	138,321	3,554
St. Paul, Minneapolis & Sault Ste. Marie Railway Co	33,027	716
Grand total	1,954,568	223,170

32. From reliable estimates furnished by railroad authorities it appears that the above freight is about 80 per cent of the total freight handled by the roads, the balance being grain and general merchandise or package freight. The table carries only the bulk freight.

33. As to the amount of local freight which would be handled by the canal, the following table shows the number of inhabitants in the counties which the canal would pass through or touch:

County and State.	Square miles.	Population, 1908.	Population, 1910.
Douglas, Wis. (exclusive of Superior)	1,289	5,115	7,038
Burnett, Wis	881	9,261	9,026
Pine, Minn	1,444	[1] 14,869	15,878
Chisago, Minn	452	[1] 14,341	12,537
Polk, Wis	933	20,885	21,367
Washington, Minn	430	[1] 28,884	26,013
St. Croix, Wis	711	26,716	25,910
Pierce, Wis	543	23,433	22,079
Total	6,683	143,504	140,848

[1] Figures for population for 1905.

34. This table shows that three counties have increased in population, five have decreased, and the entire district has lost in population during the period from 1905 and 1908 to 1910. From this it is evident that the country is not at present a growing community, while the cities at the extremities of the line are. The density of

population in the canal counties is 21 per square mile, while that of the entire United States in 1910 was nearly 26 per square mile.

35. The population of the cities at the termini of the canal in 1910 was as follows:

Duluth	78,466
Superior	40,384
St. Paul	214,744
Minneapolis	301,408
Total	635,002

36. The population of the canal counties (and many of the inhabitants of these counties could not use the canal) is approximately 22 per cent of the population of the terminal cities.

37. The canal will be discussed under the assumption that it is to be a waterway between the Twin Cities and the head of the lakes and will also serve the local population between the head of the lakes and the mouth of the St. Croix River. The freight between the terminal cities is large and serves a large population beyond the Twin Cities. For example much of the coal from Duluth-Superior to St. Paul-Minneapolis goes southward and westward to many small towns. To increase the estimate of shipments of coal by 22 per cent on account of the local population along the canal, favors the canal more than it deserves, but such increase will be assumed, since the actual population to be served by the canal is unknown; the population of the Twin Cities is the only figure available and represents the minimum to be served at the southern end.

38. The freight which may come from the east via the lakes and go to points south of the mouth of the St. Croix River along the Mississippi River is limited. La Crosse, Wis., and Winona, Minn., are the first cities of importance and their combined population is only 8 per cent of that of St. Paul and Minneapolis. Besides, they are probably in Chicago territory rather than in Duluth-Superior territory, even if the canal be built. The assumed basis is therefore probable more than fair to the canal.

39. The railroads were requested to separate the figures furnished by the Railroad and Warehouse Commission showing the bulk freight hauled from Duluth-Superior to the Twin Cities so as to give data as to what part of the total freight was represented by soft coal, hard coal, and iron. The responses show that, of the 1,954,458 tons;

	Per cent.
Soft coal represented	72.3
Hard coal represented	27.6
Iron and steel represented	.1

40. The added 22 per cent for local population along the canal increases the estimate of shipments southward of bulk goods from 1,954,568 to 2,384,573 tons. Applying the above percentages we find approximately:

	Tons.
Soft coal	1,724,000
Hard coal	658,200
Iron and steel	2,400

41. The 22 per cent increase can not materially affect the flour figures, but the total will be 251,400 tons (allowing a soldier's ration of 18 ounces per day to every individual in the eight counties). This makes the grand total of bulk freight 2,636,000 tons. Railroad people

estimate that this represents 80 per cent of the entire freight shipment. It is not unreasonable to assume that the other 20 per cent, or 659,000 tons, is divided equally between grain and general merchandise. As nearly as we can estimate the actual figures, the total freight for the fiscal year 1912 moved between Duluth-Superior and the Twin Cities and moved into and out of the eight counties along the canal would be:

	Tons.	Percentage of total freight.
Soft coal	1,724,000	52.3
Hard coal	658,200	20.0
Iron and steel	2,400	0.1
Flour	251,400	7.6
Grain	329,500	10.0
General merchandise	329,500	10.0
Total	3,295,000	100.0

42. How much of this would the canal probably carry? The Erie Canal in 1880 carried 4,608,581 tons, or 18 per cent of the total freight moved by rail and canal between Buffalo and New York. In 1906, the last year for which statistics are available, we find that the canal carried 2,385,491 tons, an actual decrease in freight handled of nearly 50 per cent, and of the total freight carried between Buffalo and New York the canal carried only 3 per cent. It had then lost one-half of its actual traffic and had dropped from 18 per cent to 3 per cent in its proportion of the total freight carried between Buffalo and New York.

Freight shipped by Mississippi River system.

	Tons carried.		Loss.
	1889	1906	
			Per ct.
Upper Mississippi	3,947,364	595,885	85
Illinois River	180,264	105,826	41
Missouri and tributaries above St. Louis	2,132,820	1,056,390	50
Total upper river	6,360,448	1,758,101	72
Ohio River	15,796,968	15,226,805	4
Lower Mississippi	6,232,087	2,546,187	59
Total Mississippi River	28,289,503	19,531,093	31

44. The Erie Canal is the best waterway for comparison with the proposed canal. Both are in a region where navigation is closed for several months by climatic conditions, and both are dependent upon and become a part of the traffic of the Great Lakes. Both are paralleled by many efficient and competing railroads, some interstate and some intrastate.

45. *Cost of transportation by canal.*—This subject will be taken up under two headings, (*a*) cost to the United States and (*b*) cost to water carrier. For the purpose of discussion several cases will be assumed: (1) That the canal operating for seven months of the year will carry all the present freight, or 3,295,000 tons; (2) that the canal will carry 50 per cent of the entire freight, or 1,647,500

tons; (3) that the canal will carry 18 per cent of the entire freight, as the Erie Canal did in 1880, or 593,100 tons; (4) that the canal will carry 3 per cent of the entire freight, as the Erie Canal did in 1906, or 98,850 tons; (5) that the canal will carry all freight except coal; (6) that the canal will carry all freight except soft coal; (7) that the canal will carry all grain and flour northward and all hard coal southward.

(*a*) *Cost to the United States.*—The canal to be commercially justified must save to the public at least $420,000 per annum, an amount equivalent to a reduction of the selling price of the freight handled under the various conditions, as follows:

	Per ton.
(1) 3,295,000 tons	$0.13
(2) 1,647,500 tons	.25
(3) 593,100 tons	.71
(4) 98,850 tons	4.25
(5) 912,800 tons	.46
(6) 1,571,000 tons	.27
(7) 1,239,100 tons	.34

(*b*) *Cost to water carrier.*—In discussing this feature it is necessary to note a circumstance which works greatly against the canal. Duluth-Superior Harbor does an immense business in both receipts and shipments. For the calendar year 1911, the total receipts were 9,424,962 tons, of which 8,434,905 tons (or practically 90 per cent) was coal. All of Duluth-Superior's receipts by Lake, except a few minor items, are such that their proper quota would be sent to St. Paul and Minneapolis. The Lake shipments from Duluth-Superior in 1911 were 21,247,884 tons, of which 19,014,620 tons (90 per cent) were iron ore, practically none of which could use the canal; 809,000 tons were wheat, of which, it will be shown later, a small amount passes through the Twin Cities and practically none would use the canal; 232,000 tons of oats, barley, and corn, of which a portion might use the canal; 431,200 tons of flour, of which one-half (see figures of State Railroad and Warehouse Commission) originates in Minneapolis and might use the canal. Of all the Lake shipments from Duluth-Superior (see Annual Report of the Chief of Engineers for 1912, p. 2461) there is little that can be claimed for the canal except probably one-half of the 431,200 tons of flour and a portion of the 232,000 tons of oats, barley, and corn. Probably nine-tenths of the general merchandise carried between the two termini moves southward. In the figures given by the Stillwater people in 1909 (H. Doc. No. 304, 61st Cong., 2d sess.) they mention 120,000 tons of general merchandise southbound and do not even mention it in the northbound statistics, but there may be a small amount in the "57,000 miscellaneous" northbound. Thus it appears that 500,000 tons would be a large figure for available freight to Duluth-Superior, while the available return freight would be more than 2,000,000 tons. It must therefore be concluded that of every four barges taking freight to the Twin Cities, at least three must return to Duluth empty. The latest available figures showing average freight rates on the Erie Canal was 3 mills per ton-mile, as given by the Interstate Commerce Commission (Railways in the United States in 1902, pt. 2, A 40-year review of changes in freight tariffs, Washington, D. C., 1903).

46. The entire distance from the Duluth-Superior Harbor to Minneapolis is about 260 miles, giving 78 cents as a payment to the water carrier on the same basis as the Erie Canal rates. It might be claimed, and justly, that the single-barge method, or that of one barge towing another, is unduly expensive between Taylors Falls and St. Paul. A fleet made up and towed by a single steamer is the economical method on an open waterway, but it would undoubtedly be more expensive to make the change. The delay to the steamer in waiting for and making up a tow could not be avoided unless the barges had to do the waiting, and if either waits there is a loss. While the steamer is towing the fleet to and from Minneapolis the barge crews would be idle. The only expense of the single barge over the fleet would be a little loss of economy in fuel and a little longer time in making the run. These would not cover the cost of the tow boat, with its necessarily lost time. The single barges, or one towing another, would undoubtedly complete the trip at both ends of the waterway without assistance and the Erie Canal rate should apply for the entire 260 miles, amounting to 78 cents per ton.

47. But it is improbable that the Erie Canal boat has to go back empty three trips out of four. The commodities to be shipped in that section are not so unbalanced in the two directions as they are between the Twin Cities and Duluth-Superior. In the case of the Erie Canal general merchandise is likely to be going in either direction; machinery and structural iron may be going in either direction; and the chances of a return cargo are much better than one in four. It would therefore appear that with the one-way traffic between the Head of the Lakes and the Twin Cities, the Erie Canal rate would be none too large and very probably too small.

48. If the two costs now be added there will result:

Case.	Canal carrying—	Cost to United States.	Cost to shipper.	Total.
1	100 per cent	$0.13	$0.78	$0.91
2	50 per cent	.25	.78	1.03
3	18 per cent	.71	.78	1.49
4	3 per cent	4.25	.78	5.03
5	All but coal	.46	.78	1.24
6	All but soft coal	.27	.78	1.05
7	Hard coal, grain, and flour	.34	.78	1.12

49. *Railroad rates.*—Between St. Paul and Duluth, January, 1913, per ton of 2,000 pounds:

Coal, hard	$1.25	Iron (bar or band)	$1.50
Coal, soft	.90	Iron, pig	1.12
Wheat	1.00	Lime	1.20
Flour	1.00	Rails	.90
Coarse grain	1.00	Salt	1.00
Lumber	1.20	Sand	1.00
Structural iron	1.50	Stone	1.00
Building stone	1.00	Stone, crushed	.80
Iron castings	2.00	Sugar	1.60
Cement	1.00		

50. These are the rates between the two cities, but not the rate paid by the St. Paul and Minneapolis merchant on general merchandise which he receives through Duluth and Superior from the east. The "package freighters" on the Great Lakes are generally railroad-

owned boats and the Twin City merchants get a "lake-and-rail" rate from the east to the Twin Cities, which gives them the advantage of a very low rate from the Head of the Lakes. This matter is now before the Interstate Commerce Commission on complaint of the business organizations of Duluth-Superior that it allows the Twin City merchant to receive merchandise and ship it back over the same lines to smaller towns more cheaply than the Duluth-Superior merchant can reach the same towns. This condition has existed many years and may or may not persist, but we will continue the discussion on the basis that the Twin City merchant may have to pay the rates above stated.

51. Having determined the average rate on the canal it remains to determine the average railroad rates on all commodities. The average rail rate for iron may be taken as the average rate on the five kinds, or $1.40. The general merchandise rate may be taken as the average on stone, cement, lime, salt, and sugar, or $1.16. The average rate on all freight may thus be determined:

	Tons.	Rate.	Amount.
Soft coal	1,724,000	$0.90	$1,551,600
Hard coal	658,200	1.25	822,750
Iron and steel	2,400	1.40	33,600
Flour	251,400	1.00	251,400
Grain	329,500	1.00	329,500
General merchandise	329,500	1.16	382,220
Totals	3,295,000	.....	3,371,070

$\frac{3,371,070}{3,295,000}$=$1.024, the average rail rate on all commodities.

If the canal rate of 78 cents be subtracted from this rail rate it gives 24.4 cents as the difference which may go to reimburse the United States for its expenditure. This practically corresponds to case (2) above, which means that the canal must haul 50 per cent of all freight in order to equal railroad rates and make good the Government's outlay.

52. *Comparison.*—The canal, in order to transport as cheaply as the railroads, must handle annually 1,647,500 tons, or 50 per cent of the traffic for the fiscal year 1912. It may be claimed that the total freight will increase from year to year and a reduced percentage will keep up the actual tonnage. This is undoubtedly true if the canal can obtain and keep up 1,467,500 tons per annum. It has already been pointed out that between 1880 and 1906 the actual tonnage carried by the Erie Canal reduced one-half and its proportional tonnage reduced from 18 per cent to 3 per cent. Thus, while the total tonnage between Buffalo and New York was increased 200 per cent, the actual tonnage carried by the canal was reduced 50 per cent. History does not favor the claim made by its advocates that the canal may not be commercially feasible now, but that, when commerce develops, it will be a necessity. If it can not compete now, there is little hope for the future.

53. In order to compete with the railroads the canal must either reduce the rates, give better service, or both. A reduction of 10 cents per ton in freight rate will not, with our present business methods, offset much inadequacy of service. It will scarcely be claimed that the canal can give better service than the railroads and it must therefore give better rates. It has been shown that it must handle 50 per

cent of the present commerce in order to equal the rail rates. It must, in order to reduce the rates an average of 12 cents per ton (average rail rate $1.024, minus case 1, $0.91), carry the present entire tonnage; must carry it all in an open season of seven months; and must give a service equal to that of the railroads.

54. The various commodities will be taken up to show why the canal will or will not carry them. In these discussions figures and estimates are taken indiscriminately from previous reports and from the remarks of Mr. Barnes made at the public hearing (Appendix B) and the papers of Messrs. Little (Appendix C) and Hall (Appendix D) and Citizens Canal Association of Stillwater, Minn. (Appendix E). It will be impossible to note the reference in all cases.

55. *Coal.*—Of all the traffic between the Head of the Lakes and the Twin Cities, 72 per cent is coal. Of this, 72 per cent is soft coal and 28 per cent is hard coal. Duluth and Superior are the coal yards of the Northwest, and particularly of St. Paul and Minneapolis. They are at the head of a system of deep-water navigation which reaches so near the eastern coal fields that the railroad haul from those fields to Lake Erie is short. They have a large harbor, with little fluctuation in water level, with flat shores, and with shallow water near the shores, affording excellent opportunities for large coal docks, where coal is handled by the most modern machinery from the large lake vessel to the docks on which it is stored ready for shipment to the consumer. When called for it is screened, loaded on cars in the same economical manner, and shipped out. Contrast these conditions with those to be found at St. Paul and Minneapolis. The Mississippi River between and including the two cities is in a gorge giving no room for large coal yards in the bottom lands and with few points where railroads can handle a large coal business between the river and the cities. The city of St. Paul is now contemplating changing the course of the Mississippi River so as to make room for a union station for passenger service. The fluctuation of the river at St. Paul is about 20 feet, and at Minneapolis it will be about 8 feet after the dam is completed. The conditions are not unlike those at Cincinnati except that the fluctuation of the river at that place is nearly 70 feet. On a fluctuation even as small as that in Minneapolis or St. Paul, the same kind of machinery for unloading coal will be needed, the same amount of labor will be necessary; the same difficulties in clamshelling the coal in the barge will be encountered, and the cost can not be much less. Regarding the cost of unloading barges at Cincinnati, the superintendent of the chamber of commerce wrote:

CINCINNATI, *June 26, 1909.*

DEAR SIR: In reply to yours of June 23, we have pleasure in inclosing tables showing the receipts here of coal for a series of years, indicating quantities by river and by rail and sources of supply.

The rail freight rate on coal from Kanawha region to Cincinnati is $1 per ton. This relates to coal destined for delivery in this market; shipments made to points beyond this market have a joint rate understood to be on a lower basis.

By river, the freight rate is 50 to 62½ cents per ton; additional to this is the cost of elevating from barges to elevators to get the coal in position for delivery on track for shipment, or to be otherwise distributed. This represents 25 to 35 cents per ton, so that the river freight plus elevating is practically the same as the rail rate.

Yours, truly,

C. B. MURRAY, *Superintendent.*

56. The tables[1] referred to in the letter show that in 1896 the river receipts were about 59,000 tons and the rail receipts were about 21,000 tons (26 per cent), while in 1908 the river receipts were about 36,000 tons and the rail receipts were about 85,000 tons (70 per cent on 50 per cent greater total receipts). The actual amount delivered by river in 1908 was only 60 per cent of that in 1896. This shows that we must allow a cost of at least 25 cents for every ton of coal delivered from the river at Minneapolis and St. Paul and further indicates that the railroads are running the Ohio River, the greatest coal river in the world, out of the coal business, on a haul of 200 to 300 miles, although the actual difference in freight rate in favor of the water haul is 37½ to 50 cents. With regard to the item of 25 cents for unloading coal at the river bank, it may be stated that the unloading at Cincinnati is done from barges entirely open. If such barges be used for coal on the proposed canal they would be entirely unfit for the carrying of any possible return freight. If the barges be decked, as they must be for handling grain or flour, the unloading of coal would be more expensive.

57. For the sake of comparison we may assume that the coal can be put into barges at the vessel's side in Duluth Harbor as cheaply as it can be put on the wharf at Duluth-Superior. This is very doubtful when we compare the modern machinery used at the large coal docks with a floating conveyor and when we consider the advantage of dumping in large piles over stowing in barges. The coal is then on its way to St. Paul, via the canal, at the same cost that it would have represented on the dock at Duluth. It must pay the canal freight rate and a cost of 25 cents per ton to unload it on the river bank in St. Paul. This unloading operation gives it an extra handling with a clamshell bucket. It is now in the same condition with respect to delivery to the consumer that it is on the dock at Duluth, ready to be screened and delivered. The large coal dealers place a mininum deterioration of 25 cents per ton as the result of breakage in each handling of coal such as is necessary in unloading from the barges at the river bank. The coal is now on the river bank and has cost the wholesale dealer the same that it would on the wharf at Duluth, plus the canal freight rate, plus 25 cents for unloading and elevating, and plus 25 cents by deterioration in unloading. This 25 cents for breakage is probably the explanation of the fact that Cincinnati prefers to get its coal by rail rather than by river.

58. The coal has to be screened and delivered to the carload consumer and to the local coal yard just as at present it has to be, from the coal dock at Duluth or Superior. In those cities the charge and cost of carload deliveries to large consumers and to retail yards is 25 cents per ton, and there is no reason to believe that it would cost less in St. Paul.

59. The cost of coal to the wholesale consumer or retail dealer in the Twin Cities must be either—

(*a*) By rail: The cost of the coal on the lake vessel in Duluth-Superior, plus the cost of unloading, screening, and loading, plus the railroad rate (90 cents for soft and $1.25 for hard), and plus the dealer's profit; or

[1] Not printed.

(*b*) By canal: Every item the same, except that for railroad rate there must be substituted canal rate plus 75 cents for unloading, breakage, and delivery.

60. It therefore appears that the dealer can afford to pay a canal rate of 15 cents per ton on soft coal and 50 cents per ton on hard coal. This actual rate on the Erie Canal basis should be 78 cents. In these figures there is no return to the United States on its investment.

61. This discussion presumes that the wholesale dealer in the Twin Cities can practically supply everybody largely in the open season of navigation. To keep any large stock during the closed season he would require more storage room than can be had on the river, and in that case another storage yard will be necessary, requiring an additional handling and hauling to that yard and the rent of such a yard, for all of which the consumer must pay. It may be argued that the cost to the consumer would be reduced by avoiding this additional yard and that he will stock up for the winter. Such an argument is futile. Even though the consumer may know the conditions, he, either from necessity or from a preference for seeing the coal merchant's money rather than his own tied up in his needed supply, will order his coal as he wants it throughout the winter season. As that is the season of greatest consumption in all lines, there is little doubt that one-half the coal consumed in St. Paul and Minneapolis will require the extra handling and hauling and the extra storage yard away from the landing place on the river bank.

62. If cost does not favor the canal, and it does not, we must look to service. Any consumer or dealer in St. Paul or Minneapolis can order from a coal company a carload of coal one morning and generally he will have it at his door or yard the next morning, and certainly the second morning with delivery made from Duluth or Superior. He could not get it much more quickly if delivery were made from stock in his own city.

63. Duluth-Superior is the natural and economical coal yard for St. Paul and Minneapolis.

64. Much of the coal coming to St. Paul and Minneapolis is for railroad use, and would naturally be hauled by the roads themselves.

65. The coal used for Government purposes in the Twin Cities will not move by the canal, as there is a land-grant rate of 50 per cent on Government freight.

66. It can be safely stated that the consumer or retail dealer is not going to buy coal from the Minneapolis or St. Paul wholesale dealer through sentiment rather than from the agent of the Duluth or Superior dealer when he can get the same coal with good service from the latter at a considerably lower figure.

67. The canal will not, if built, move coal from the head of the Lakes to the Twin Cities. Coal is 72.3 per cent of the traffic between Duluth-Superior and St. Paul-Minneapolis, leaving 27.7 per cent, or 912,800 tons, for the canal. With this amount of freight the cost of transportation to the United States becomes.

$$\frac{420{,}000}{912{,}800} = 46 \text{ cents.}$$

68. This, added to 78 cents for freight by the canal, gives $1.24 as the cost of transportation. The average railroad rate on the same

commodities is $1.09. Therefore the canal can not carry the coal and can not exist on all other freight combined.

69. Various statements have been made as to the percentage of the coal received at Duluth-Superior which goes to St. Paul, Minneapolis, and the Minnesota Transfer. In the fiscal year 1912 the railroad figures show the latter to be—

	Tons.
Soft coal	1,724,000
Hard coal	658,200
Total	2,382,200

In the same fiscal year the receipts at Duluth-Superior were:

	Tons.	Percentage to the Twin Cities.
Soft coal	7,115,831	24
Hard coal	1,255,330	52
Total	8,371,161	28

Since little of the 1912 receipts would move to the Twin Cities before June 30, it would probably be better to take the receipts at Duluth-Superior for the calendar year 1911 and compare them with the Twin Cities receipts for the fiscal year 1912:

	Tons.	Percentage to the Twin Cities.
Soft coal	7,070,337	24
Hard coal	1,364,568	48
Total	8,434,905	28

Based on the figures given it may be stated that of all the coal received at Duluth-Superior about 28 per cent goes to St. Paul, Minneapolis, and the Minnesota Transfer; that of the soft coal about one-quarter goes to those places; and that of the hard coal about one-half reaches those points.

70. *Wheat.*—The great wheat-growing section of the United States lies north of an east and west line through St. Paul. Three railroad systems are available for shipping this crop direct to Duluth-Superior without passing through the Twin Cities and only a very small part of that going to the head of the Lakes is hauled by the roads between Minneapolis and Duluth. The statistics submitted by the Stillwater citizens show that in 1908 there were hauled from the Twin Cities to the head of the Lakes 2,562 cars of wheat, or about 2,135,000 bushels. The wheat shipped by lake from Duluth-Superior the same year was 53,057,105 bushels. The railroads between the Twin Cities and Duluth hauled into Duluth-Superior 4 per cent of the wheat carried down the Lakes from that harbor.

71. The rate on wheat from the Twin Cities to the head of the Lakes is $1 per ton, or 3 cents per bushel. Wheat coming through from certain favored points goes to the head of the Lakes at a cheaper rates. The actual added amount for completion of the trip to Duluth is sometimes as low as 1 cent per bushel. A large shipper of

wheat in Minneapolis states, however, that 90 per cent of the wheat pays 3 cents per bushel, or $1 per ton. Wheat coming into Minneapolis from the favored points may be stopped, offered for sale, and then sent on to Duluth without increase in rate. The wheat (90 per cent of the whole), which must pay $1, comes into Minneapolis on cars on its way to Duluth. In order to transfer to barges, it must pay an elevator charge of three-fourths cent per bushel, or 25 cents per ton; it would probably have to assume a different rate of insurance by water, leading to trouble and complications; and, although grain men claim that it takes as long as five days for rail shipments to reach Duluth from the Twin Cities, there is no doubt that they will average considerably shorter in time than those by canal. A case is related by a Duluth vessel agent where he, even in the congested season of 1912, learned on Saturday of an available vessel which would have her coal unloaded on Monday and could not get an ore cargo. A Minneapolis dealer had a cargo of wheat in Minneapolis which he wanted shipped. The wheat was delivered in Duluth and on its way down the Lakes by Tuesday noon. This could not have been done by canal. It may be argued that it could have moved earlier by canal. It would not have then been available for sale in Minneapolis, as it was, up to the time the vessel was chartered. Again had it gone on to Duluth by canal it might have been held there many days in barges—not a cheap storage—without obtaining a vessel to carry it.

72. The elevator charges (25 cents per ton) having been paid in Minneapolis, the wheat will be on the barges with 75 cents to pay a canal rate of 78 cents—on the Erie Canal basis, neglecting the Government's investment. The wheat may be in an elevator in Minneapolis, and then it has to pay no more elevator charges than it would by rail, and the full $1 will be available for expense by canal. There are no figures to show what portion of the wheat going to Duluth-Superior now passes through the elevators (actually unloaded and loaded again) in Minneapolis on its way. It is not believed that it is large. It is seen above that 46 cents per ton should be charged against the freight to reimburse the public even if the canal hauls everything but coal, making $1.24 (78 cents + 46 cents), the full cost by canal under those circumstances. So there is no hope that the canal will haul the wheat even in the most favorable case, except at a loss to the United States on its investment.

73. A Minneapolis wheat dealer states that the canal would be a great boon to the business. For what, since it can not compete with the rate by rail? To relieve the terrible congestion in Minneapolis? That would make the canal useful three months in some years and not at all in others. In support of his claim he submitted figures which showed the shipments by the roads—Northern Pacific, Great Northern, and Omaha—for the months of September, October, and November, 1912. An analysis of those figures showed some very startling traffic for the Omaha road. Upon investigation he learned that the figures from the books of that road included everything going out of Minneapolis—not to Duluth-Superior only. By allowing that the Omaha and Soo lines together carried as much as the average of the Great Northern and Northern Pacific, the shipments shown in the table below result. It is not believed that these two

roads shipped together as much as the average of the other two, for the Great Northern and Northern Pacific hauled in the fiscal year 1912, 92 per cent of the return heavy freight, as shown by the figures of the Railroad and Warehouse Commission. On the assumed basis, however, the figures are:

	Tons.
Wheat, 2,784,030 bushels, or	83,521
Corn, 404,760 bushels, or	11,333
Oats, 382,560 bushels, or	5,738
Barley, 913,725 bushels, or	21,879
Rye, 31,440 bushels, or	880
Flax, 140,055 bushels, or	3,922
Flour, 2,009,580 barrels, or	200,958
Mill stuffs	82,521
Linseed oil, 2,579,633 pounds, or	1,290
Oil cake, 31,733,504 pounds, or	15,867
Hay	1,610
Total	429,519

74. It will be seen that these figures are larger than those given by the citizens of Stillwater in their statistics for 1908, being on wheat 30 per cent more (for the three heavy months only) than the entire shipment for 1908. The wheat crop for 1912 was very large. It is understood that every elevator in Duluth-Superior and in Minneapolis was full at the end of the lake navigation season; that thousands of loaded cars lay in Minneapolis; that all available ships on the Lakes were loaded with wheat; that the harbor at Buffalo was full of loaded ships; and that the insurance season on the Lakes was extended 15 days in order to relieve the grain congestion. Under these conditions it is not seen how the congestion could have been relieved by the canal, except to use the barges as storage, which would have amounted to little. Even with this heavy freight movement, and if it had all gone by the canal (i. e., represented the canal freight for the year), the tax alone to reimburse the United States for its investment, maintenance, and operation would have been,

$$\frac{420{,}000}{429{,}519}=98 \text{ cents},$$

almost the cost of complete shipment by rail, as the average rail rate on all this list is practically $1. If less than the full amount given had been shipped by canal during the entire season the amount necessary to reimburse the public would have been more than the rail rate. Without a return cargo and without coal there can be none; the canal rate must be greater than 78 cents.

75. The canal can not compete with the railroad rate; it can not give better service; it can not relieve the congestion in large crop seasons; and it can not be brought into use in connection with the Minneapolis elevators, without a great deal of work on them in most cases and rebuilding in some cases. There appears to be no consideration whereby the canal can recommend itself as a transporter of wheat or coarse grain from Minneapolis to the head of the Lakes.

76. *Coarse grain.*—In this are included rye, oats, barley, and corn. Most of such grain comes from a section farther south than the wheat-producing country, although some of them are raised in the same section. The statistics of the Stillwater citizens show that the railroads in 1908 shipped 4,500,000 bushels of these grains from Minne-

apolis and St. Paul to Duluth-Superior. The Duluth-Superior statistics show there were shipped down the Lakes the same year 13,000,000 bushels. Duluth-Superior, therefore, got their local consumption and 8,500,000 bushels from other localities than through St. Paul and Minneapolis. The 4,500,000 bushels means about 93,000 tons which moved to the head of the Lakes from St. Paul and Minneapolis. That portion of these grains raised in the general wheat section must almost necessarily find its outlet via the Great Lakes, as they would reach their natural market most cheaply that way. It is evident that 93,000 tons from Minneapolis and St. Paul found an outlet that way in 1908. But would any great amount be diverted to Duluth-Superior from the country south of St. Paul if the canal existed? The destination of these grains is St. Louis, Milwaukee, and the Middle and Southern States where large quantities are used in distilleries and breweries or fed to stock in sections too far south to raise them economically. Their great market is Chicago. From St. Paul the Mississippi River runs southeast 143 miles to La Crosse, then turns south. From that point to Chicago is 270 miles by rail, and the rate on all grains is $2.50 per ton. Suppose grain comes to the Mississippi River by rail at La Crosse. It has the choice of taking the canal and reaching Chicago via Duluth-Superior or of continuing on to Chicago by rail at $2.50 per ton—probably reduced somewhat on through rate from point of origin to Chicago. Elevator charges at La Crosse (1 cent per bushel; average weight per bushel, 45 pounds) will be 44.4 cents per ton; freight from La Crosse to Duluth (at canal rate of 3 mills per ton-mile, 326 miles) 98 cents per ton; elevator charges in Duluth, 44.4 cents; and 2½ cents per bushel water transportation to Chicago, $1.11 per ton. This gives a total of $2.98 or an actual loss of 48 cents.

The average value of a ton is about $210. It will require 9 to 10 days to make the trip via Duluth without any delays, and there are many chances for delays. From La Crosse to Chicago by rail should be made in 3 days. The interest at 5 per cent on $210 for 6 days is 17 cents and would be an additional loss to the 48 cents, or a total loss of 65 cents per ton. There is nothing in the canal to attract coarse grains from La Crosse, and La Crosse is considerably north of the Iowa-Minnesota line. Thus the canal can not draw coarse grain from Iowa, Missouri, and Nebraska; coarse grain is discussed under "wheat" in a way to show that the canal can not carry that from Minneapolis and St. Paul at a profit on the railroad rates; and it can therefore ship only the small amount that might reach the Mississippi River south of St. Paul and north of La Crosse—the southern limit of canal competition with rail to Chicago. This might mean 100,000 tons. In 1908 the Twin Cities sent 93,000 tons to the head of the Lakes and in September, October, and November, 1912, they sent 88,000 tons. It will therefore be conceded that the canal might carry 100,000 tons of coarse grain from the country between St. Paul and La Crosse.

77. *General merchandise.*—This class of merchandise is ill adapted to transportation by barges. Little or none of that received in the Twin Cities via Duluth-Superior originates in the latter cities. It practically all comes from the east under the lake-and-rail rate already mentioned, which costs the Twin City merchant only 40 cents per ton over the cost to the Duluth merchant. As long as this

arrangement exists there is no chance for this class of freight to be handled by the canal. This freight is handled on the lakes by railroad-owned steamers; the railroads allow free storage and handling in Duluth and Superior; it is not adapted to barge transportation, and the railroads are not going to handle it from its origin to Duluth-Superior and then turn it over to independent barge owners for delivery in St. Paul, not if they have to haul it at a loss. (See Appendix C, by Mr. Little.)

78. No reason whatever can be seen for putting general merchandise in the list of probable freight for the canal.

79. *Iron and steel.*—These goods come under the same lake-and-rail rate as applies to general merchandise, and the same statements and conclusions will apply. It therefore appears that this material has practically no chance of going by the canal.

80. There is nothing left for the canal but an admitted 100,000 tons of coarse grains to Duluth-Superior and a possible shipment of 250,000 tons of flour in the same direction. What appeared a 4 to 1 one-way traffic from Duluth-Superior now becomes a complete one-way traffic to Duluth-Superior. With only 350,000 tons available, the cost to the United States will be:

$$\frac{420{,}000}{350{,}000}=\$1.20.$$

81. *Flour.*—The rate on flour from Minneapolis to Duluth is $1 per ton on all roads. But the railroads allow free storage and handling at Duluth-Superior for flour hauled by them from Minneapolis. They haul it heavily during the slack or winter season and when the navigation season opens on the lakes there is a large stock on hand at the head of the lakes ready for shipment. The independent barge owner would have no storage, unless he built or rented it, except his barges. The vessels carrying flour on the Great Lakes are railroad owned; the railroads need flour as freight, particularly in the winter; they are convenient to the mills at Minneapolis and the docks at Duluth; and who can be so filled with optimism as to believe that flour would be transported by canal to Duluth and there received on equal terms by railroad-owned vessels even if the canal rate could compete with the railroad rate? One dollar per ton is the regular rail rate (although one road charges $1.50) and the canal rate has to be counted as 78 cents, leaving 22 cents per ton for transferring to the steamer at Duluth. This allows nothing to reimburse the United States for its expenditure, which has been shown to require 13 cents per ton if the canal hauls everything between termini and along its route, and 46 cents per ton if it hauls everything but coal. On wheat, which is more easily handled than flour, the elevator charge in Duluth-Superior is 1 cent per bushel or 33 cents per ton, and the railroad-owned steamer in Duluth is not going to make it easy for the independent barge owner who has hauled the freight naturally belonging the railroads. Much flour now goes to the shores of Lake Michigan for shipment east, being hauled over roads in which, it is stated, the mills are interested. It is believed that it would require a great reduction in freight rate to make the flour mills desert the railroads, and the canal can not bring about this reduction. The flour mills can not be blamed for desiring

to favor the railroads, as they would be absolutely dependent upon them five months in the year if the canal were built.

82. Flour will not go by the canal.

83. *Local freight.*—It is therefore manifest that there is nothing left for the canal but the local freight—18 per cent of the entire freight. It will be seen by looking back to case 3 that, with 18 per cent of the total freight, the Government's expenditure would amount to 71 cents per ton. Local freight would be largely general merchandise and we have seen that the lake-and-rail rate allows the St. Paul merchant to ship well back toward Duluth cheaper than the Duluth merchant can reach the same point. All the towns on the St. Croix River are below Taylor Falls, and the St. Paul merchant under present freight conditions can more than compete with the canal on general merchandise and steel—he can entirely defeat it. The production and consumption of the whole canal region north of the Grantsburg crossing of the Northern Pacific Railroad (and this is in the favored territory) are little or nothing to support a canal.

84. *Development.*—The claim is made that the canal will develop a large commerce, and such articles as building stone, clay products, sand, cement, and lime are mentioned. This is all based on the absolutely mistaken idea that the freight rates through the canal are going to be 40, 50, or 60 cents per ton less than railroad rates, and that these very cheap rates will start a great trade in such things as must, in order to move at all, have very low rates. These false figures are based on what is read of the freight rates on such a waterway as the Great Lakes, where large volumes in one cargo are carried in the cheapest manner possible, and where rates are often much lower than they would be but for the fact that vessels can afford to move freight cheaply in order to get return cargoes, and thus be at least making expenses both ways. It is not appreciated by these advocates of canals that there is a vast difference between moving many thousand tons in one cargo over a wide, deep, direct and level waterway and taking the same commodities in small barges through a narrow, unduly long and shallow waterway over intervening hills to a height of more than 400 feet. There can be no cheap rate over such a waterway, and in the present instance there is not enough difference between the actual cost of transporting any commodity over the proposed canal and the present railroad rate to pay for the extra handling, breakage, inadequacy of service, loss of time, and probably increased insurance in the case of articles liable to damage from water. The whole argument is based on a fictitious low rate to result from the canal, and they all assume that a low rate must follow its construction—they have heard it stated and do not question it. It can not follow, will not follow, and should not be expected to follow.

85. *Effect on railroad rates.*—If the canal can not compete with the present railroad rates a reduction of railroad rates to meet canal rates is impossible.

86. *Diversion of traffic.*—It has been claimed that the canal will attract a large commerce not now existing; that it will actually stop the shipment of coal from the Illinois fields to St. Paul and Minneapolis by rail, all coal for these cities coming via Duluth-Superior

from eastern fields; and that much grain from the country south of St. Paul, which now goes direct to Chicago, will go via Duluth-Superior through the canal. The whole foundation of these arguments is that same fictitious low rate through the canal.

87. *Steel plant.*—Great stress is laid on the large steel plant now building in Duluth by the United States Steel Corporation. Its products may go east and compete in the eastern market. It has chosen to bring the coal to its iron ore, rather than take its iron ore to the coal. This is a wise move to balance shipments. The large bulk-freight carriers on the Great Lakes have iron ore and grain to take down the lakes and nothing but coal to bring back. The shipments of ore and grain from Duluth-Superior Harbor in 1911 amounted to more than 20,000,000 tons. The coal brought back was about 8,400,000 tons; three vessels of every five came back empty. The establishment of a large steel plant at Duluth does away with the necessity of shipping its consumption of ore and calls for a corresponding increase in the receipts of coal. It tends to balance trade and thus reduces the number of lake vesesls necessary to do the same amount of business. It should result in more economical production of the finished article and may enable the corporation to ship its steel down the lakes to the greater market, using an entirely different class of vessel—the class that brings back general merchandise—from the bulk freighter. The Duluth steel plant may, and probably will, ship its product west into the undeveloped country toward the Rocky Mountains. But will it ship south? Not far. As soon as it reaches La Crosse it will be in the natural territory of its own plant at Gary and it is not establishing two plants to compete in the same territory. The Gary plant now has shallow-water connection with the Mississippi River at Rock Island and St. Louis, and in the probably not distant future will have a deeper canal.

88. The large volume of the Duluth steel plant's product will not go south; its raw material will come from the mines and the Lower Lakes; and it can have no great interest in this proposed shallow-water canal.

89. *General summation.*—The Erie Canal rate would require a payment to the water carrier of 78 cents. The Government's expenditure on the canal would tax the freight to various extents, from 13 cents to $4.25, corresponding to the proportion carried by the canal (from 100 per cent down to 3 per cent) of all freight between St. Paul-Minneapolis and Duluth-Superior and all the freight of eight counties which the canal will pass through or touch. If we neglect for the time being the Government's expenditure the different commodities will appear as follows:

(*a*) Soft coal: Canal rate=78 cents; unloading at St. Paul or Minneapolis=25 cents; breakage in unloading=25 cents; 50 per cent transferred to another yard, at least 10 cents; making same delivery that railroad makes=25 cents; total=$1.63. Rail rate on soft coal=90 cents. Loss=73 cents per ton.

(*b*) Hard coal: Canal rate=78 cents; unloading at St. Paul=25 cents; delivery in St. Paul=25 cents; total=$1.28. It will be noted that the anthracite coal is charged nothing for breakage or extra handling to another large yard. Rail rate on hard coal=$1.25. Loss, 3 cents per ton.

(*c*) Iron and steel: Canal rate=78 cents; unloading in St. Paul (same as coal which is more easily handled)=25 cents; delivery (same as for coal)=25 cents; total=$1.28. Storage in Duluth-Superior lost. Listed rail rate, $1.40 (actual much less). Gain, 12 cents per ton.

(*d*) General merchandise: Exactly the same throughout as iron and steel, $1.28. (Storage in Duluth-Superior lost.) Listed rail rate, $1.16 (actual much less). Loss, 12 cents per ton.

(*e*) Grain: Canal rate=78 cents; elevator charges in Twin Cities 27 cents per ton (three-fourths cent per bushel, average weight of grain shipped Duluth-Superior 55.6 pounds per bushel, or 36 bushels to the ton); elevator charges in Duluth-Superior (1 cent per bushel), 36 cents; total=$1.41 per ton. Railroad rate on grain=$1 for 90 per cent and 50 cents for 10 per cent, or an average of 95 cents. Assume that one-half the wheat passing through Minneapolis would pay elevator charges even if sent forward by rail, 13.5 cents; elevator charges in Duluth-Superior 36 cents; total=$1.445. Gain, 3.5 cents per ton.

(*f*) Flour: Canal rate=78 cents; loading in Minneapolis same as on cars; transferring in Duluth-Superior (same as wheat)=33 cents; total=$1.11. (Loss of free storage and advantage of stocking up in Duluth-Superior during winter for spring opening.) Railroad rate=$1. Loss, 11 cents per ton.

90. By adding the amount necessary to reimburse the United States—shown in each case under the heading—there will result:

Table showing loss per ton.

Article.	Case 1, 13 cents.	Case 2, 25 cents.	Case 3, 71 cents.	Case 4, $4.25.	Case 5, 46 cents.	Case 6, 27 cents.	Case 7, 34 cents.
Coal (soft)	$0.86	$0.98	$1.44	$4.98	.....	.....	.....
Coal (hard)	.16	.28	.74	4.28	.....	$0.30	$0.37
Iron and steel	.01	.13	.59	4.13	$0.34	.15	.....
General merchandise	.25	.37	.83	4.37	.58	.39	.....
Grain	.095	.215	.675	4.215	.425	.235	.305
Flour	.24	.36	.82	4.36	.57	.38	.45

Then the actual losses, if we assume that everything will be carried in the same proportion, become:

Actual loss.

Article.	Case 1.	Case 2.	Case 3.	Case 4.	Case 5.	Case 6.	Case 7.
TONS.							
Coal (soft), 1,724,000	$1,482,640	$844,760	$446,861	$257,566	.....	.....	.....
Coal (hard), 658,200	105,312	92,148	87,672	84,513	.....	$197,460	$243,534
Iron and steel, 2,400	24	156	255	297	$816	360	.....
General merchandise, 329,500	82,375	60,958	49,227	43,197	191,110	128,505	.....
Grain, 329,500	31,303	35,421	40,034	41,665	140,038	77,433	100,497
Flour, 251,400	60,336	45,252	37,107	32,883	143,298	95,532	113,130
Total loss	1,761,990	1,118,695	645,156	460,121	475,262	499,290	457,161
Tons	3,295,000	1,647,500	593,100	98,850	912,800	1,571,000	1,239,100
Loss per ton (average)	$0.53	$0.68	$1.09	$4.65	$0.52	$0.32	$0.37

91. The most favorable of the assumed conditions (case 6) is the one wherein the railroad is allowed to move all the cheap freight (soft coal) and the canal is given all the higher class freight; but, even under these conditions, the loss would be 32 cents per ton. The only way to make up this loss would be for the water carrier to reduce his rate from 78 to 46 cents, and even then he would be only equaling the rail rate. If he improves 8 cents on the rate, he will be carrying freight, at 39 cents, or at just one-half the rate for an equal distance on the Erie Canal. Again, the conditions imposed—that he must in seven months of the year haul everything, except soft coal, for the whole year—are absolutely impossible. If his proportion should drop to 50 per cent of all the high class freight he would have to carry it at 20 cents per ton (one-quarter of the Erie Canal rate) in order to equal the railroad rate.

92. There is no combination on which the canal can get the freight to an advantage to the public, without reducing the Erie Canal rate per ton-mile to about one-half.

93. This means that, in addition to the Government's annual loss of $420,000, the canal, if used, would impose a heavy tax on the community. Of course, the result would be that the Government would have to stand the loss of $420,000 per year, and the community would use the railroads. When once built, the slightest excuse—a few barge loads of hay per year moved from out-of-the-way places to the railroads, no further—would be enough to require the operation and maintenance of the canal.

94. In this discussion it has been considered that all freight will make the complete distance and pay 3 mills per ton-mile the whole way. Shorter hauls may occur, but the shorter the haul the greater the advantage of the railroads, advantages for short hauls are always with them. Coal to Cincinnati (200 to 300 miles) goes by rail; to Memphis it goes mostly by river.

95. *Argument.*—It has been claimed that the assumed elevator charges are too high, and that, by foreseeing one's needs and inviting offers from various elevators thus stimulating competition, cheaper rates may be obtained. This controversy was settled by three questions and answers. (1) What is the standard charge for elevator service at the present time? Answer.—Three-fourths cent per bushel in Minneapolis, and 1 cent in Duluth-Superior. (2) Can there be any guarantee that, in case the canal be built and a large commerce established, even the standard present rates may not be increased? Answer.—No; but a raise would not be probable. (3) In your opinion, would the board be justified in allowing anything lower than the standard charge? Answer.—No.

96. It has been claimed that the charge for delivery, landing and deterioration of soft coal are too high. To these claims it can be stated that the charge for delivery in carload lots in Duluth-Superior (and the coal people claim the actual cost is about equal to the charge) is 25 cents, and no reason can be seen why it will, or can, be done more cheaply in the Twin Cities. Cincinnati reports the cost of unloading from open barges to be 25 to 35 cents, and, with fuel so much cheaper there, no reason can be seen why it should cost as little as 25 cents here—especially if it has to be unloaded from decked barges. No return freight can be handled in open barges. Regarding breakage, 25

cents is generally given as a low figure by the people in Duluth-Superior who handle coal in large quantities. It will be seen that in the general summation no charge is made for breakage in hard coal. There is no doubt that, with a rail rate of $1, and a water rate of 50 to 62½ cents, Cincinnati is reducing its actual receipts by water. The difference by canal and rail figured herein is only 12 cents on soft, and 47 cents on hard coal.

97. *Lake service.*—The service on the Great Lakes is an express service. The vessels are large and expensive to run, the rates are low, and they must be kept moving in order to pay. As a result there have been established in Duluth-Superior the most complete system of handling bulk freight—iron ore, coal, and grain—that can be found anywhere in the world. Many of the steamers carrying general merchandise and flour are also passenger steamers running on schedules made out the previous winter. Everything is done with the greatest possible dispatch. Large lake freighters figure in hours if not in minutes the time they can get their cargoes and get away. They are not going to favor any method of handling freight which will delay them. They must have a full load and have it at once. Canal barges must be loaded and unloaded as quickly as the same material can be delivered on or received from the wharves. A vessel arrives with 11,000 tons of coal. She can unload at a coal dock in a few hours. It will require 20 barges of 550 tons' capacity to carry her cargo. They must be on the spot and receive the coal as fast as it could be unloaded on the wharves. They must be decked barges if they are going to bring any possible return freight from Minneapolis. The coal must be loaded in the barges through hatches and spread out to a depth of 5 feet, whereas on the wharf it is dumped in large piles. This is for a single cargo. Suppose 10 coal-laden vessels come in in one day; 200 barges must be on hand to take it all, and there must be 10 unloading devices ready to start work promptly. The 10 vessels can go to coal docks and be unloaded. A passenger vessel arrives at 10 a. m. She wants 2,500 tons of flour. She must sail at 10 p. m. That amount of flour must be on the wharf or on a lighter alongside as soon as she lands. By canal it may be coming down the slope from the Brule River. The vessel must look out for another cargo or she must go without that earning capacity, and the five canal barges, trailing down the slope, must delay in Duluth, unavailable for return service, until another vessel can receive their flour. The only alternative is adequate terminal facilities, with storage, for transfer from boat to barge, where probably the majority of the freight will have to be stored and loaded when craft are available. This means an extra handling and the cost of the storage, neither of which has been considered in the above general summation.

98. *Steamboat canal.*—The board is indebted to Capt. George Winans, a great enthusiast for the canal and a practical steamboat man on the Mississippi River, for the cost of running a towboat such as he states would tow four barges on the Mississippi River. His figures of daily expenses taken from his books are:

1 master and pilot	$8.00
1 pilot	5.00
2 engineers	5.50
2 firemen	4.00
1 cook and helper	4.25

4 men	$8.00
2 watchmen	4.00
Fuel	25.00
Supplies	7.25
Oils	1.00
Total	72.00

99. His tow would consist of four barges 135 feet by 34 feet by 6 feet, estimated to draw 1 foot empty and 5 feet loaded, the four barges carrying about 2,200 tons, 550 tons each. It will, for the sake of argument, be assumed that the canal is a steamboat canal and could carry such a tow. The distance from Minneapolis to Taylors Falls (open river navigation—half up river and half down river, either way) is 92 miles, and the tow could make 5 miles per hour, or cover the distance in 18.4 hours. In the canalized river, and particularly in the canal, where waits at passing points and for other boats to lock through would have to be made and where night navigation would be difficult, it is doubtful if an average speed of 3 miles per hour could be made. The distance from Taylors Falls to Allouez Bay is 160 miles, and at 3 miles per hour would require 53.3 hours. This tow would have to break up at every lock and lift, the four barges going through together and the steamboat following. Allowing 20 minutes for the operation of each lock and 35 minutes for each lift (small estimates for a steamboat canal), as allowed for a barge canal in House Document No. 69, Fifty-sixth Congress, first session, there would be required for 17 locks (including that between St. Paul and Minneapolis) and 8 lifts: $(\frac{17\times20+8\times35}{60})2=20.6$ hours. This gives $18.4+53.3+20.6=92.3$ hours, or 184.6 hours for the round trip.

When the tow reaches Allouez Bay it is quite a distance from the harbor of Duluth or Superior; there will be considerable time lost in distributing boats to different points and delivering them at others for the return cargo besides the time of unloading and loading; and it is not believed that the time so consumed can average less than 12 hours at each terminus, and it will probably be more. The towboat will be busy all that time and can not take advantage of it for repairs and cleaning boilers. It is not unreasonable to allow 7.4 hours for such work out of every 9 days and the result is that it will take 9 days on an average to make the round trip. It will be all that can be expected if one such fleet can make 23 round trips in a season, requiring 207 days out of a possible navigation season of 7 months, or 214 days. Allowing the fleet to be in commission 214 days at $72 would cost $15,408. Steel barges of the same dimension as those recommended by Captain Winans, except that they were 150 feet long instead of 135, recently built at Ambridge, Pa., for the St. Louis engineer office, cost $11,120 each, delivered in St. Louis. In the same proportion Capt. Winans's barges should cost $10,000 each. He estimates that he can put the deck houses and partially submerged cargo holds on them at $2,500 each. He claims that he can build a purely towing steamer of steel that will handle such a fleet in the Mississippi River for $20,000. This figure appears small and there is grave doubt whether it can be done. It will, however, be assumed that his four barges will cost $50,000 and his towboat $20,000. It is custo-

mary to figure on steamboats 18 per cent to cover depreciation, maintenance, insurance and interest (5 per cent) on the investment, and on barges 13 per cent for the same items. Now 18 per cent on $20,000 amounts to $3,600 and 13 per cent on $50,000 amounts to $6,500. It will be assumed that the plant can be laid up in the fall, cared for five months and put in commission for $1,000. The expenses are then:

Operating	$15,408
Overhead charges on towboats	3,600
Overhead charges on barges	6,500
Winter care	1,000
	26,508

Possible freight=23×2,200×2=101,200 tons.

Cost per ton=26.2 cents.

100. This cost allows nothing for office expense, agents at terminals or other incidentals—practically supposes that the captain of the boat runs his own boat and does the business thereof without even a clerk on the boat or a representative at either end of the line. It also supposes that he can, without delay, obtain a full cargo for every barge at each end of the line. It has been shown that, of such freight as would go by water, four-fifths comes from Duluth-Superior and one-fifth goes to Duluth-Superior. On this basis, and considering the whole transportation problem, there would be three empty barges to one loaded one on the return trip to Duluth-Superior, and the total freight carried would be five-eights of 101,200 or 63,250 tons at a cost of 41.9 cents per ton. This is 1.61 mills per ton-mile against 3 mills on the Erie Canal. This was to be expected since the cheapest method of handling freight on shallow water is in fleets of barges towed by steamer. It comes nearer representing a large cargo vessel. Therefore, under present conditions of one-way traffic, the very cheapest method of handling cargoes in a steamboat canal would be 42 cents per ton, and this allows the owner and master of the fleet only 5 per cent on his investment and not even salary for himself for 5 months unless he becomes shipkeeper and earns a part of the $1,000 allowed for winter expense. If not, he gets $8 per day for 214 days, or $1,712 for his year's services.

101. It is doubtful if many Mississippi River steamers are run as economically as Capt. Winans's figures would indicate. His crew of 4 deckhands (2 to a watch) and 2 firemen (1 to a watch) looks small to handle such a fleet without even a mate to boss them. Again, it is very doubtful if any river plant would be built if the figures on paper could show nothing more than a return of: Wear and tear, insurance, operating expenses of the fleet only (no office or terminal expenses), and 5 per cent on actual cash invested. A large manufacturer in St. Paul recently stated that money could not be had for such an enterprise unless an income of 15 per cent could be shown on paper.

102. Capt. Winans's business is towing logs and lumber where he picks up the raft when notified that it is ready and drops it on delivery. It is inconceivable that a regular business in moving freight between two harbors, where shipping may occur at one end from any point along several miles of river front or from either of two towns 13 miles apart and at the other end from almost any point of 50 miles of water front, can be carried on without an

office and agent in St. Paul-Minneapolis and another in Duluth-Superior, if not one in each of the four cities. In Duluth-Superior, where four-fifths of the freight will be received, lake vessels will not be waiting for a steamboat man to come and unload them. There is plenty of room for them to unload their coal and general merchandise, and waiting will not be tolerated. A canal business of any importance would require outlay at each terminal in the shape of offices and agents to arrange as to where the canal cargo was to be discharged and the return cargo to be had. The lake vessel owner or captain will not be looking along the water front for some fleet of canal boats with 2,000 tons of freight to load his lake vessel, which will carry 12,000 tons. Terminal expenses would be considerable, and Capt. Winans's estimate of cost does not even allow for a long-distance telephone message. Assume that the freight can be moved at Capt. Winans's figures. We have seen that if all the freight available were moved by a barge canal at 78 cents the loss would be 53 cents per ton. To avoid this loss the canal freight must be reduced to 25 cents to make canal equal to railroad. Capt. Winans can move it at 42 cents. Conclusion: If the much more expensive steamboat canal were built and Capt. Winans's meagerly equipped outfit could handle all the present freight in seven months, there would be a loss to the public of 17 cents per ton.

103. It will be seen that in case 5 his rate approaches the rail rate. Allowing the barge-canal rate of 78 cents there figures a loss of 52 cents. To avoid this loss only 26 cents can be paid for freight. The freight, assuming no coal to be carried, is evenly enough balanced to make it cost the captain 33 cents, and he is only 7 cents behind the railroad rate. In case 6 the barge-canal loss was 32 cents on a 78-cent freight rate. Therefore, a freight rate of 46 cents could have been paid without any loss. The movement is so balanced that the captain could have handled the freight at 33 cents, showing a saving of 13 cents on 1,571,000 tons, or $204,250. With a movement of 1,571,000 tons, the reimbursement to the United States was 27 cents. Had the movement been decreased so as to cost the United States 40 cents there would have been no saving.

$$\frac{420{,}000}{.40}=1{,}050{,}000 \text{ tons}=67 \text{ per cent.}$$

104. In order to equal the railroad there must be carried 67 per cent of everything but soft coal.

105. Similarly in case 7 the loss on a 78-cent rate was 37 cents. There could have been paid 41 cents without loss. The freight movement is so balanced as to have cost Capt. Winans 28 cents, showing a saving by his method of 13 cents per ton on 1,239,100 tons, or $161,083. In case 7 the cost to the United States was 34 cents per ton. Should the amount of freight handled be such as to raise this cost to 47 cents, the captain's saving of 13 cents would disappear.

$$\frac{420{,}000}{.47}=893{,}617 \text{ tons}=72 \text{ per cent.}$$

106. Advantage must be had of selecting an evenly balanced, high-class freight (grain and flour north, and hard coal south) and 72 per cent of it must be carried by the captain's cheap method in order for him to equal the present railroad conditions.

107. All of this discussion is based on the cost to the United States of the barge canal. In House Document No. 330, Fifty-fourth Congress, first session, it was estimated that a steamboat canal via the St. Louis River would cost 70 per cent more than a barge canal. If the increased cost of maintenance, operation, and interest on investment for a steamboat canal via the Brule-St. Croix over that for a barge canal were 49 per cent, it would entirely wipe out the largest saving shown for the steamboat method of towing. On the basis of 70 per cent increase in cost of construction the interest alone would increase the Government's annual expense by 46 per cent, leaving only 3 per cent, or $12,600, for increased cost of maintenance and operation of a steamboat canal over that of a barge canal.

108. It must therefore be concluded that:

(*a*) Even with the steamboat method of towing, the conditions necessary to show a saving (having the pick of the freight and necessarily moving 67 or 72 per cent of it in the open season) are so rigorous that they could not be expected to exist—and this with no additional cost to the United States for construction, operation, and maintenance over those of a barge canal.

(*b*) With the additional cost to the United States of the steamboat canal, there are no possible conditions which would show the steamboat method of towing to be as economical to the public as the railroads.

(*c*) The water supply at the summit level has been reported doubtful for a steamboat canal, and more recent investigations make it more than doubtful.

(*d*) There is nothing to recommend a steamboat canal rather than a barge canal.

109. *Water power.*—Great hopes have been based on the water power to be developed along the route. Estimates have been placed, on the value of the large horsepower to be developed, running into very high figures. The paper submitted by the Stillwater Citizen's Canal Association (Appendix E) states:

> Assuming that this amount of power (50,000 horsepower) could be utilized in the operation of the canal and for commercial purposes and sold at the very low average of $20 per horsepower, it would represent an annual income of $1,000,000.

110. A recent investigation of the power possibilities of the St. Croix River shows that it is possible to develop 12,650 continuous horsepower in the first 140 feet of elevation above Taylors Falls. There remains to the summit level an elevation of 123 feet and a watershed of 2,084 square miles. The Markham-Kelsey project, near the Northern Pacific bridge (to Grantsburg), with a head of 60 feet and a watershed area of 5,675 square miles gives a horsepower of 8,000 (continuous). If, in the same proportion, all the water above the 140 feet above Taylors Falls Dam could be concentrated in one dam it would give 6,000 continuous horsepower. This is a limit no one will claim could be attained. It must not be forgotten that, to a considerable extent, navigation and power development are antagonistic. At the time that the summit level waters must be conserved and held for navigation, the power developments need them

most. Water used to lock boats up or down the river is water absolutely wasted for power purposes. If the summit level furnishes just enough for navigation in the dry season, it will not furnish one cubic foot for power purposes. There are only 94 feet fall in the total canalized portion of the Brule and its summer flow is not more than 200 second feet, giving about 1,700 continuous horsepower. The small streams crossed by the canal on the Lake Superior slope would give very little horsepower—probably scarcely worth developing, being in such small units. The total watershed of these streams above the canal line is not seven townships, or 252 square miles. If each stream could locate a 60-foot dam on the lake side of the canal, the total development (based on the St. Croix Valley rainfall and run-off) would amount to 720 horsepower. Thus we have a possible development of 21,000 horsepower (allowing 100 per cent efficiency) instead of 50,000. The figure of $80 (or even $20) per horsepower year appears attractive, but sight seems to be lost of the fact that there will not be a power house, a turbine, a generator, or a transmission line included in the Government work of developing navigation. An idea of what the Government may expect to get from these developments may be had from the project between St. Paul and Minneapolis. The plan, which passed one House of Congress, was to pay the United States 4 per cent on $700,000 (the additional cost of the dam, made necessary to produce the power), giving $28,000 per annum to the United States for 15,000 horsepower, on the basis of dam and power house foundation furnished by the United States. On the St. Croix and Brule Rivers there is no estimate for even the power-house foundation, which is more expensive than the same length of dam. This allows the United States $1.87 per horsepower year. It is understood that the measure failed of passage because it was thought that 4 per cent should be paid on $950,000 (the total cost of the dam, the increased height of lock, and the power-house foundation), giving a value to the United States of $2.53 per horsepower year. The 21,000 possible horsepower on the St. Croix and Brule may therefore figure as worth to the Government an annual rental of from $39,270 to $53,130 when power-house foundations have been provided. This is small compared with the $420,000 annual expense of the canal to the United States, and very small compared with the Stillwater estimate of $1,000,000.

111. *Terminal facilities.*—Adequate terminal facilities exist in Duluth-Superior for transfer from lake to rail equalled in few ports in the world for handling bulk freight. There are no terminal facilities available for transfer from lake vessels to canal barges. These must be provided either in the shape of floating elevators and derricks for handling freight alongside the lake carriers at dock or at anchor in the harbor, or they may be provided by systems of docks where the lake carrier lies on one side and the canal barge at the other side, the freight being transferred across. At St. Paul and Minneapolis there are no terminal facilities except the usual Mississippi River levee at the St. Paul steamboat landing. Practically no terminal facilities suitable for canal purposes exist at either locality, but it is presumed they will build up if a large commerce demands them. If the board's recommendation be adopted, they will not be needed.

112. *Ultimate fate of such a canal.*—The commissioner of corporations reported in 1909:

> About 4,500 miles of canals have been constructed. More than one-half—2,444 miles, costing $80,000,000—has been abandoned.

113. It is the firm belief of the board that the construction of the proposed canal would result in an ultimate addition to every one of the figures in the above quotation.

114. *Conclusion.*—The board therefore finds that the proposed canal connecting Lake Superior and the Mississippi River by way of the St. Croix River is not now feasible and practicable, considering the necessary location, plans, costs of construction, commerce affected, and water supply.

CHAS. L. POTTER,
Lieutenant Colonel, Corps of Engineers.
FRANCIS R. SHUNK,
Lieutenant Colonel, Corps of Engineers.
E. D. PEEK,
Captain, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors, see p. 3.]

APPENDIX A.

REPORT OF G. A. TAYLOR, JUNIOR ENGINEER.

UNITED STATES ENGINEER OFFICE,
Duluth, Minn., January 4, 1913.

From: G. A. Taylor, junior engineer.
To: Capt. E. D. Peek, Corps of Engineers, Duluth, Minn.
Subject: Lake Superior-Mississippi River canal survey.

I submit herewith the following report describing the route traveled by myself and party and the results of the exploration. The examination included the Amnicon and Moose Rivers, the divide between the headwaters of these rivers and the adjacent country; also the country from the Amnicon River to Allouez Bay, with a view to determining the feasibility of constructing a barge canal by this route from Duluth-Superior Harbor to the St. Croix River, and thence via the St. Croix River to the Mississippi River. I have also considered the comparative merits of this route and the Brule River route, a report on which may be found in House Document No. 33, Fifty-fourth Congress, first session.

The Amnicon and Moose Rivers were gauged in various places, as well as their tributaries, as is shown in a tabulated form herewith; the character of the river bed and soil of adjacent land and location of some dam sites were noted.

In looking up data before leaving the office it was learned that the Wisconsin Central Railroad Co. (now controlled by the Soo Railroad) in locating their line to Duluth and Superior in 1904–1905, ran a preliminary line up the Moose River across the divide between that river and the Amnicon and a short distance down the latter. By request the notes of this survey were obtained, including topography and level notes, and these have been a great help and have given far more accurate and reliable information, especially as to summit elevations, than would have been possible to obtain in the limited time and at the expense contemplated in this exploratoin.

The results of my examinations and explorations will follow and are illustrated by profile and map accompanying.

(In referring to location by sections the figures only will be used. Thus 8–48–12 will be used as an abbrevaition for section 8, township 48 north, range 12 west.)

Route traversed.—In compliance with your instructions dated October 14, 1912, I assembled a party consisting of Mr. Charles Carisch, United States junior engineer, as sketcher and topographer, two cruisers, and a cook, and with them left Duluth October 15, via the Northern Pacific Railway for Amnicon Falls, Douglas County, Wis. The Amnicon River was explored down to the crossing of the Brule-St. Croix survey sketching the controlling features of topography.

I looked over the country between 18–48–12 and 3–48–13 for a suitable route to Allouez Bay.

Possible dam sites were noted and elevations taken by aneroid barometers to give the profile of the river, after which I proceeded to explore the Amnicon River south to its source.

The tributaries of the Amnicon River being small and the discharge of the river itself being entirely inadequate for canal purposes, a search was made for feed water for the summit level. To this end I looked over streams to the west in 46–13 and 14, and 47–14.

The Black River was gauged and barometer elevations taken in several places, and the country lying between this river and the headwaters of the Amnicon explored to determine the practicability of using Black River as a feeder for the summit level. The country east of the summit was also explored to determine the possibility of bringing feed water from the east, and also the possibility of

going around the highest portion of the divide between the Amnicon and Moose Rivers.

It was found practicable to use a team for moving the camp outfit by clearing out the old St. Croix Road and as it would have been necessary to cut a trail to pack over, the team proved the more economical, and in this way we were able to make long moves with less lost time than would otherwise have been possible.

The Wisconsin Central Railway preliminary line "D" was followed in exploring the summit level. After leaving the Amnicon River this line practically followed the east one-sixteeenth line through the sections lying directly south to the crossing of the Moose River.

The Moose River, its tributaries and the contiguous country were explored to its confluence with the St. Croix River. The Moose River was gauged at several suitable places and the St. Croix River at a point 50 feet below the mouth of the Moose River.

Barometer elevations were taken on bench marks of the Brule-St. Croix canal survey of 1894 at the big dam on St. Croix River, and a cursory examination made of the St. Croix River from the mouth of the Moose River up to Upper St. Croix Lake while moving party and camp outfit to the railroad at Gordon, Wis.

This ending my mission relative to the Amnicon-Moose River route, the party returned to Duluth on November 6, 1912.

Previous to starting on this trip, I took a barometer to Hawthorne, Wis., where a railroad bench mark referred to sea level is located, and where this barometer was read hourly by Mr. M. J. Hoard during the time field work was in progress.

The location and course of the Amnicon and Moose Rivers with some of the dominating topographical features and some elevations in the adjoining territory may be seen on the map. The elevations referred to sea level of the different points on the course of these two streams, as well as over the divide between their headwaters, is shown on the profile. The map and profile accompany this report.

Description of Amnicon River from its source northward.—The Amnicon River has its source in Amnicon Lake in 46–14, which lake is fed by small streams from a comparatively small drainage area to the northeast of the lake. The river leaves the lake with very little current and flows through a flat, swampy country for about 1 mile, where it joins the Bear River, which has its source in swamps about the center of 45–14. Bear River is a sluggish stream flowing through a flat, marshy country. After its junction with Bear River, the Amnicon flows in an easterly direction to Lyman Lake through a country somewhat rugged, but with only slight fall. Lyman Lake is shallow, having an area of about three-quarters of a square mile. The land to the south and west is low and swampy. There is a logging dam at the outlet of Lyman Lake with a possible 11-foot head, which in former years has been used in logging operations, but is now out of repair. When closed this dam flooded the swamp to the south and west. The ground to the north of Lyman Lake is some higher than in the immediate vicinity, but is not of sufficient height to maintain more than a 15-foot head of water.

Amnicon River leaves Lyman Lake in an easterly direction for about 1 mile, when it turns to the north and continues in this general direction for 7½ miles. This portion of the river traverses a broken country of red clay and bowlders. Ledge trap rock is often encountered, and the bed of the river is mostly bowlders and gravel. The river falls rapidly to the north with no marked falls, but almost continuous rapids, there being a total fall of 199 feet in this stretch of river. The course of the river is sinuous, with bottoms one to seven hundred feet wide, and the general elevation of adjacent land from 20 to 50 feet above the river.

Then the river flows to the east and northeast, after which it flows in a northerly direction to 8–48–12, which is as far as my mission took me along the river.

From the center of 11–47–13 through 12–47–13 and 7–47–12 the river is slower, running through a bottom land south of a range of rock ridges. These ridges lie 600 to 800 feet north of the river and have an elevation of 140 feet above the river. The bottom lands through which the river flows are from 400 to 700 feet wide, of sand, with land 20 feet higher to the south. Through these bottoms the course of the river is very tortuous and changes during high water, there being numerous old river beds which at the present time are dry.

After the course of the river turns to the northeast in 7–47–12 its fall is more rapid, the bed of the stream becoming more rugged with ledge trap rock and bowlders predominating. This condition prevails as far as the center of 32–48–12, where the fall of the river becomes greater, and small falls of from 1 to 3 feet over bowlder or ledge rock become common. It continues so as far as 29–48–12, where there is a series of five falls, called Amnicon Falls, ranging from 4 to 26 feet in height. There is a total fall of 120 feet in about 1 mile in 32 and 29–48–12. At the last falls situated near the east and west one-quarter line of 29–48–12 the formation of rock changes abruptly from trap to sandstone, and from this point north is of sandstone formation. The river continues rapid with a bed of bowlders and gravel with short stretches of sandy bottom. From 32–48–12 north the course of the river is through a very rugged country with deep ravines with ridges rising 80 to 100 feet above the river.

As will be noticed by reference to the profile the Amnicon River in the southeast quarter of 18–48–12 is 100 feet below the general level of the surrounding country, which would necessitate a dam of this height. The bottoms are 800 feet wide. This condition holds true throughout the lower reaches of the river. Deep, wide ravines leading off from the river bottoms preclude the possibility of supporting a canal along this river bank, thus avoiding so large a dam.

There are at present no dams on the Amnicon River below the outlet to Lyman Lake.

The table of gaugings for the discharge of this river is given on another page. At the time these gaugings were taken the river was at a low stage, but not at its lowest stage. From settlers and other evidence, it seems probable that at times the flow of the river is not over one-half of the present discharge. Such a stage of low water probably occurred during the season of 1894 when, according to evidence obtained, Lyman Lake was about one-half foot lower than at present.

Line from Amnicon River to Allouez Bay.—The extension from Amnicon River in 18–48–12 to Allouez Bay presents no obstacles greater than those that would be encountered in the Brule-St. Croix westerly extension. The soil is red clay with a few bowlders, and the country is uniform, sloping gently to the north, crossing some ravines, which are not deep, and could be made use of for impounding water for canal purposes.

The Moose River from its source southward.—This river has its source in Moose Lake in the southeast corner of 36–46–13. This is a shallow lake of about 12 acres surrounded by swamp land. It has a drainage area of about 3 square miles, and the discharge from the lake is small.

The river leaves the lake in a southerly direction and in 12–45–13 is joined by a branch from the northeast, after which it continues in a southerly direction to its confluence with the St. Croix River. There are four logging dams on the Moose River. These are small earth dams of from 9 to 12 foot head, with timber sluiceways and gates, used in past years in logging operations, and at present are more or less out of repair and the gates in all of them are open. These dams with the gates open hold more or less of a head of water. That located in 35–45–13 holds a head of 8 feet and the water backs up 1¾ miles above the dam. The other dams hold a head of from 2 to 4 feet with the gates open.

The Moose River does not fall as rapidly as the Amnicon, but is a rapid stream. It its upper reaches it is not as swift as in the lower half of its course. The soil in the vicinity of the stream is sandy loam, becoming very sandy in the lower four miles of its course.

The bed of the river is gravel and bowlders, as a rule, with occasional short stretches of sand bottom. There are no falls on the stream, but rapids abound throughout its length. Ledge trap rock is frequently encountered, it being very common south of the town line between 44 and 45.

The course of the river is winding, but not to the same degree as in the case of the Amnicon. The river bottom is comparatively narrow, varying from one hundred and fifty to six or seven hundred feet in width, with adjacent land generally from 25 to 50 feet above the river. The character of the river course and its fall are best explained by the map and profile previously mentioned.

The divide between Amnicon and Moose Rivers.—The country in 23, 26 and 35–46–13, which sections lie due south of the Amnicon River and on the shortest course to the Moose River, is all swamp with an occasional low

island of more firm bottom. In 23 and 26 the soil is bog and soft muck. Soundings taken in these sections by the Wisconsin Central Railway in 1904–1905 show soft bottom to a depth of from 12 to 24 feet underlaid with sand. The elevation of this swamp is 1194 feet above sea level. The ground rises to the south until at the south line of 2–45–13 it has an elevation of 1,206 feet above sea level. The actual divide or water shed on a direct line between the Amnicon and Moose rivers is a ridge of hills in the south half of 11–45–13 with an elevation of 1,232 feet above sea level. The soil is sandy loam and gravel with a few scattering bowlders. Most of the country is cut over and much of it burned over and grown up with small second growth. In 2–45–13 is a spruce swamp of considerable extent where the original spruce timber is standing.

The large swamp south and southeast of Lyman Lake is bordered on the east in section 24 and the northerly portion of 25–46–13 by a range of hills rising about 30 feet above the elevation of the swamp, which precludes the possibility of bringing feed water in from this direction, as this range forms the watershed from the west for the head waters of Middle River.

There is comparatively low ground from this swamp diagonally through 25 and 36–46–13 from northwest to southeast, to Moose Lake at the southeast corner of section 36.

A canal built from the swamp, above mentioned, by this route and thence down the Moose River would go around the ridge of hills in 11–45–13, and would probably have to cross a maximum elevation of about 1,210 feet above sea level. As this route would add nothing to the water supply but increase the length of canal 2 miles or more, and make it more indirect, it is thought that the direct route with a cut through the higher ground is the more advantageous.

A careful examination of the country at the summit developed what is shown quite conclusively on the map accompanying, viz: the land lying between the headwaters of the Amnicon and Moose Rivers is the apex of the country in this vicinity, from which streams flow in all directions.

By examination Black River in 34–47–14 was found to have an elevation of 102 feet below Amnicon Lake, and in 8–46–14, 72 feet below the same lake. The land adjacent to the river on either side is from 40 to 50 feet above the river, but not of such a height as to make it possible to dam the river and carry the water over to Amnicon Lake. The discharge of the Black River at this time is but 9 second-feet in 8–46–14, and settlers at this point report that it was practically dry in summer of 1910.

As previously stated, no feed water can be supplied from the east, because of a range of hills in that direction from which the land falls to the east.

My examination of the country brings me to the conclusion that the only supply of water available for the summit level of a canal is that which can be derived from the Amnicon River watershed above and including Lyman Lake. This watershed has an area of approximately 65 square miles, or 1,812,096,000 square feet.

The mean precipitation at Duluth for the last 42 years is 30 inches per annum. Assuming that the precipitation at the headwaters of the Amnicon River is the same as at Duluth, and that 0.8 foot can be saved for storage, we have 1,449,676,800 cubic feet available. Assuming that the canal would be in operation six months during the year, there is 93 second-feet available for canal purposes, provided it can be properly conserved.

At present the discharge from the Amnicon River where it leaves Lyman Lake is 6 second-feet.

Both the Amnicon and Moose Rivers are flashy streams. Their tributaries are small, comparatively short, and fall rapidly. The flood stage is of short duration, lasting from three to seven days.

Conclusions.—The distance from Allouez Bay to St. Croix River via the Amnicon and Moose Rivers, following the general course of the rivers, but not including their windings, is 35 miles.

The total elevaton to overcome from Allouez Bay to the crest of the divide is 630 feet.

The total fall from the crest of the divide to the St. Croix River at the mouth of the Moose River is 245 feet.

Because of the ruggedness of the country adjacent to the Amnicon River, its very tortuous course, and the presence of ledge rock at intervals throughout its length, this river would be very expensive to canalize.

The divide between the Amnicon and Moose Rivers offers no insurmountable difficulties. The surface soil being muck on a substratum of sand, the filtration

may be expected to be large. Some rather heavy earth work may be necessary through the crest of the divide.

The Moose River can be canalized with no great difficulty so far as topography of the country is concerned. Some ledge rock would be encountered.

The water supply by the Amnicon-Moose River route is inadequate for canal purposes. I am directed by my instructions to find an "available water supply by local streams or by feeders, so as to obtain five or six hundred or more second-feet for the operation of the canal." This I find it impossible to do, for reasons previously stated.

In this connection it may be stated that my examination was made at a favorable season of the year. There had been a deficiency in rainfall in this locality for some time. The swamps were comparatively dry and the streams were at a low stage. While the discharge, as shown by the gaugings, may not be the minimum for the streams, it probably approximates it, as it is not likely that they have a smaller discharge for any considerable length of time.

The country crossed by the proposed extension from Amnicon River in 18–48–12 to Allouez Bay and the land adjacent to the Amnicon River from the crossing of the Northern Pacific Railway to 12–47–13 is fairly well settled and the land more or less cleared and improved. From here south there are a few scattered settlers as far as 2–46–13. To the south of this point across the divide and down the Moose River to 12–44–13 the land is unimproved. The timber has been cut and much of the country burned over. There is one settler, with some cleared land, in 12–44–13. There are improved farms in 14–44–13, and from here to the mouth of Moose River there are settlers and the land is more or less improved. The cost of right of way would be small, as a large portion of the land needed is of little value in its present state.

Comparison of Amnicon-Moose River route with Brule-St. Croix River route.

Length Allouez Bay to mouth of St. Croix River:		
Via Brule-St. Croix Rivers	miles	210
Via Amnicon-Moose Rivers and St. Croix	do	184.5
Difference in favor of the Amnicon-Moose route	do	25.5
Drainage area tributary to summit:		
Via Brule-St. Croix Rivers	square miles	731
Via Amnicon-Moose Rivers	do	65
Difference in favor of Brule-St. Croix route	do	666
Probable water supply from area tributary to summit for 6 months:		
Via Brule-St. Croix River route	second-feet	917
Via Amnicon-Moose River route	do	93
Difference in favor of Brule-St. Croix River route	do	824
The water supply, as determined by gaugings of streams at a low stage:		
Via Brule-St. Croix River route	second-feet	625
Via Amnicon-Moose River route	do	6
Difference in favor of the Brule-St. Croix River route	do	619

Lift to be overcome on the different routes:

	Allouez Bay to crest of divide.	Crest of divide to Mississippi River.	Total.
	Feet.	*Feet.*	*Feet.*
1. Brule-St. Croix River route	420	355	775
2. Amnicon-Moose River route	630	565	1,195
3. Difference in favor of Brule-St. Croix route	210	210	420

NOTE.—The figures in this report relative to the Brule-St. Croix River canal route are taken from the report on this subject printed in House Document No. 330, Fifty-fourth Congress, first session, and so far as this route is concerned apply to the date of surveys and examinations made at that time.

The Brule-St. Croix River route has not been looked over in full by the writer. Knowledge of this route has been obtained by going over the portion of the route from the mouth of the Moose River to the upper Lake St. Croix, conversation with Mr. Charles Carisch, United States junior engineer, who was an instrument man on the survey of this route, and by a careful perusal of the reports previously referred to.

From the evidence obtained from all these sources of information and a personal knowledge of the Amnicon-Moose River route I am of the opinion that, despite the fact that the Brule-St. Croix River route is 25½ miles longer, it is the better route.

The supply of water by the Amnicon-Moose River route is so entirely inadequate as to make the operation of a canal by this route, save by pumping water, impossible.

The supply of water being fundamental in considering the possibility of a canal, and the possible supply in this case being so obviously inadequate, I have not taken the time to go into a study of the best elevation for a summit level and other related subjects that would be considered if a canal by this route were deemed feasible.

The distance from Allouez Bay to Amnicon River is about 5½ miles; from there to where the route leaves Amnicon River, 14½ miles; across the divide, 6 miles; Moose River to its mouth, 9 miles. The total distance from Allouez Bay to the confluence of the Moose and St. Croix Rivers is about 35 miles.

The elevations along the Amnicon River were taken by barometer, and corrected by comparing with readings of a fixed barometer located at Hawthorne, Wis., read hourly, and referred to a railroad bench mark of known elevation. This is also true of elevations on Moose River below 11–44–13. The elevations over the divide from 14–46–13 south and down the Moose River to 11–44–13 are most of them based on spirit levels from the Soo Railway survey of 1904–5, which have been reduced to sea level. The profile accompanying is compiled from the data thus obtained.

The rivers were located by tying to section lines by means of pacing and was very well done by cruisers, as was demonstrated on numerous occasions when I had means of checking their work.

List of existing dams which have been used in logging operations but are now more or less out of repair, Lake Superior and Mississippi River canal survey via Amnicon-Moose River.

Location, etc.	Purpose.	About.
		Feet.
Amnicon River, 22–46–13, 2 sluiceways	Logging operations	11
Amnicon River, 24–46–14	do	9
Moose River, 13–45–13, 1 sluiceway	do	9
Moose River, 23–45–13, 1 sluiceway	do	9
Moose River, 35–45–13, 2 sluiceways	do	12
Moose River, 14–44–13, 2 sluiceways	do	9

Results of gaugings, Lake Superior and Mississippi River canal survey via Amnicon-Moose and St. Croix Rivers.

Date.	Location, etc.	Area of cross section.	Mean velocity per second.	Discharge per second.
	AMNICON RIVER.			
		Sq. feet.	*Feet.*	*Cu. feet.*
Oct. 17	SW. 17–48–12, bottom gravel and bowlders	23.25	0.85	20
19	NW. 7–47–12, bottom gravel and sand	44.0	.59	26
19	NW. 12–47–13, bottom gravel and sand	9.25	1.067	10
21	NW. 11–47–13, bottom gravel and bowlders	11.38	.84	10
21	N. line 14–47–13, bottom gravel and sand	8.75	.70	6
24	SE. 11–46–13, bottom gravel and bowlders	17.75	.42	7
	LITTLE AMNICON.			
Oct. 21	SW. 11–47–13, bottom gravel and sand	3.75	.48	2

Results of gaugings, Lake Superior and Mississippi River canal survey via Amnicon-Moose and St. Croix Rivers—Continued.

Date.	Location, etc.	Area of cross section.	Mean velocity per second.	Discharge per second.
	BLACK RIVER.			
		Sq. feet.	*Feet.*	*Cu. feet.*
Oct. 23	SW. 27-47-14, bottom gravel and bowlders	25.0	0.44	11
24	Center 4-46-14, bottom gravel and bowlders	21.5	.48	10
24	SE. 8-46-14, bottom gravel and bowlders	53.5	.17	9
	AMNICON RIVER.			
Oct. 24	24-46-14, bottom gravel and bowlders	39.1	.27	10
	MOOSE RIVER.			
Oct. 30	SE. 23-45-13, bottom gravel and bowlders	10.1	1.10	11
Nov. 1	SE. 12-44-13, bottom gravel and bowlders	10.5	.58	6
2	SE. 14-44-13, bottom gravel and bowlders	9.93	.54	5
5	75 feet above mouth of river, bottom gravel and sand	45.11	.31	14
	ST. CROIX RIVER.			
Nov. 5	50 feet below confluence with Moose	144.6	1.19	172

List of possible dam sites found along the rivers explored which are suitable for the storage of water or canalizing purposes.

Lake Superior and Mississippi River canal survey via Amnicon-Moose Rivers.

Location.	Height of dam possible (approximately).
AMNICON RIVER.	
SE. 18-48-12	100
SE. 29-48-12	80
SE. 7-47-12 (site of old dam now all gone)	25
SE. 23-47-13	35
NE. 26-47-13	30
SE. 35-47-13	20
SE. 2-46-13	58
NE. 11-46-13	60
NE. 23-46-13	18
MOOSE RIVER.	
SE. 13-45-13 (old dam can be raised to)	15
SE. 23-45-13 (old dam can be raised to)	15
SE. 35-45-13 (old dam can be raised to)	27
SE. 14-44-13 (old dam can be raised to)	15
NE. 23-44-13	28
SE. 27-44-13	26

The list of possible dam sites includes only such sites as particularly attracted attention because of topography and other features which rendered the location specially suitable for such purpose.

In this report I have endeavored to make clear the results of my examination of the Amnicon-Moose River route made in compliance with your instructions of October 14, 1912.

The map and profile, together with data given in this report, are as accurate as can be obtained from a survey of this nature, and may safely be used for approximate estimates.

G. A. TAYLOR.

APPENDIX B.

STATEMENT MADE BY JULIUS H. BARNES, ACTING CHAIRMAN AND REPRESENTING THE PUBLIC AFFAIRS COMMITTEE OF THE COMMERCIAL CLUB, DULUTH, MINN., AT THE PUBLIC HEARING HELD JANUARY 15, 1913, AT DULUTH, MINN.

Mr. Barnes said: We have listened for so many hours to estimates and forecasts and imaginings and hopes of tonnage developments to be made by this proposed Lake Superior and Mississippi waterway that I almost hesitate to venture to record the opinion of myself and those whom I represent against this project, analyzing it in a commercial way. I am, however, delegated to speak the opposition of the Commercial Club of Duluth of 1,000 members after careful consideration against this project and, with your kind permission, will detail the reasons which lead us to this conclusion.

One of the most recent works on waterway transportation, a volume by Harold P. Moulton, "Waterways *v.* Railways," analyzes the various waterways which he has investigated. He refers to European waterways just covered in the remarks of our friend, Mr. Harrison, but arrives at very different conclusions as to their justification from those expressed by our friends here. He sums up the situation somewhat as follows:

"It is agreed that since the traffic carried on the Great Lakes is tremendous in amount, we have there ample proof of the practicability of transportation by water; but a little reflection will show that no conclusion in support of river and canal transportation ought fairly to be drawn from the Great Lakes. They are a great natural highway similar to the ocean itself. They are of ample depth, free from current, and of great width. Moreover, they stretch in a general east and west direction through the heart of the continent and in the very pathway of our greatest commerce."

It is quite natural that we, who live in Duluth on those Great Lakes, and seeing the great economy of transportation because of this deep waterway should, perhaps, think the word "waterway" is one to conjure with and that anything which merits the name waterway must necessarily be an economy of transportation; but a study of this question has convinced us that there is a great difference between a great deep-water highway with only semi-occasional interruptions to remove or to improve and that of a shallow, artificial waterway, every foot of which costs money and effort and a carrying capacity of which would in the end be very doubtful.

That the Great Lakes themselves have justified themselves beyond any hope on the part of railroads of ever competing with them as a carrying facility is beyond question. I think Maj. Potter several years ago in a Government report first called attention to the fact that the saving in transportation costs in one season alone far more than offset the entire cost of all improvements since the beginning of our Government on these Great Lakes, including channels and harbors as well. That this is, with the development to-day, far understating the condition is shown by the following figures: The season rate per ton of ore from the Head of the Lakes to Lake Erie ports for 1912 has been 40 cents per ton. The rail rate from the Head of the Lakes to Lake Erie ports on ore ranges from $3.75 to $4.50 per ton; a saving of $3.50 per ton on the single item of ore, the volume of which for this season through the Soo Canal was 46,303,000 tons, and here we have a saving of $162,000,000 on this item.

The rate on grain for this season has averaged about 1½ cents per bushel on the Lakes. The rail rate on grain between Duluth and Buffalo is 20½ cents per hundredweight or 12.3 cents per bushel, a saving on grain alone of 11 cents per bushel on this tonnage through the Soo Canal this year, amounting to 243,100,000

bushels, a saving in grain transportation costs of $27,000,000. Westbound the rate on coal between Buffalo and Duluth has been about 30 to 35 cents per ton. The rail rate on the same haul is $3.15 per ton, a saving on this one item westbound through the Soo for 1912 on 14,931,000 tons of about $41,000,000; a total saving on three articles alone of $230,000,000 for the one season of 1912.

The most recent figures I have seen of the estimates of expenditures of the Government in all directions on the Great Lakes has been about $100,000,000. One of the great transportation geniuses of this country is James J. Hill of St. Paul, the head of the Great Northern Railroad. Mr. Hill formerly ran a steamer on the Mississippi River below St. Paul. Evidently his judgment was such that he left the water transportation business on the river and took up railroading instead. He has always been a deep student of the transportation problem and I want to read into the records a public utterance of his on this point. This is a quotation from the evidence before the Interstate Commerce Commission, Docket 4335:

"Speaking of St. Paul, Mr. Hill got back to one of his favorite themes, the river. He said: 'St. Paul was the head of navigation, but the river had done but little good because Congress had not been able to lath and plaster the bottom. I would rather have a railroad along the river in spite of the competition because of the low grades it affords. A railroad that is well built, he declared, will give you cheaper transportation than you can get in any other way unless you can get 20 feet of water. I won't compromise on 12 or 15.'"

Now, we have the 20 feet of water. We have still some needs and improvements to develop along that 20-foot highway. No railroad can compete with it. But when you propose to build a 7-foot waterway, or an 8, 9, 10, or 12 foot waterway, I think the testimony of a transportation student like Mr. Hill is very pertinent regarding its commercial possibilities of competition in carrying.

These gentlemen have argued that one of the important influences of a waterway, no matter how shallow, is the controlling of railroad rates. I have had a little practical experience of that in our own business as regards the Erie Canal. Twelve years ago we had a canal rate on grain from Buffalo to New York of 2½ cents per bushel. To-day we are paying the railroad paralleling that canal 6 cents and the Erie Canal has 7 feet of water and is open seven months of the year, just the same as this canal proposed here. Why has it not been able to hold down railroad rates in that time? The answer is because its carrying possibilities on that depth are limited. The way to control railroad rates is by Federal control such as is being evolved now, and not pour the Federal treasure into commercially useless ditches. A short, shallow waterway is the height of folly. The transshipping charges at either end would kill its commercial possibilities. The waterway is limited in its possibilities. It can not reach to the individual farm, as a railroad can by its siding. It can not reach to the mines because mines are usually in hilly and mountainous country and waterways can not be constructed in such a country. A railroad siding can run to the very mine pit. A waterway can hardly reach the factories which need transportation facilities. The transportation facilities from a deep, practical waterway like the Great Lakes to a railroad should be the most important subject for the investigation of our transportation expert. That is the problem that remains to be solved to give the full benefit to our great cheap waterway. In view of the rosy pictures painted by the advocates of these shallow waterways and of the developments that follow its construction, it seems almost cruel to read a cold-blooded statement into this record. But I want to read this from the reports of 1909 (pt. 1, p. 15), of the Commissioner of Corporations on this very subject. He says: "About 4,500 miles of canals have been constructed. More than one-half—2,444 miles, costing over $80,000,000—has been abandoned."

Gentlemen, the advocates of this canal are wrong, fundamentally wrong. There is no need for it; there is no tonnage to be developed by it; the tonnage which now exists would never move by it; and it would be a most glaring commercial failure.

APPENDIX C.

LETTER OF MR. J. A. LITTLE.

SUPERIOR, WIS., *March 4, 1913.*

GENTLEMEN: At a hearing held at the Commercial Club in Duluth, Minn., January 15, 1913, before the Board of Engineers, to whom this communication is addressed, representatives of St. Paul, Minn., Stillwater, Minn., Duluth, Minn., and Superior, Wis., introduced statements of their views as to the advisability of and necessity for a survey of a proposed route for a canal to connect the Duluth-Superior Harbor and the Mississippi River.

While it was generally understood that the discussion at this hearing was to bear largely on the desirability of surveying a canal route via the Amnicon, Moose, and St. Croix Rivers, most of the statements submitted were of a general nature, bearing on the necessity of and benefits to be derived from a canal via some feasible route between the termini. We shall proceed with our discussion on the theory that in order to warrant the expenditure of money by the Federal Government for this purpose, it must be shown that there is a present commercial necessity for this canal commensurate with the estimated cost thereof, and that the benefits of such a canal will be widespread and not confined to any one locality. It seems elementary to say that the Government should not expend a large sum of money without securing a substantial benefit to a sufficient volume of commerce. It seems equally true that such large expenditures of money can not be properly made to confer a specific advantage to one or two cities in their commercial competition with cities more favorably located on waterways on which the General Government has already expended large sums of money to make such waterways more efficient servants of the hinterland back of the port located thereon. To state our position concretely, we believe that careful analysis of the commerce which might be affected by the proposed canal will show that any benefit following the building of this canal would be confined almost entirely to the cities of St. Paul and Minneapolis and would affect their ability to compete with the cities of Superior and Duluth for the great trade of the Northwest, which normally moves through Superior and Duluth. If the advantages flowing from the construction of a canal between Lake Superior and the Mississippi must come largely to the Twin Cities, the project is one which should be financed by the Twin Cities if undertaken at all and not by the Federal Government.

In considering the business which would be affected by this canal we shall assume that whatever route was selected for the canal the distance from Superior to the mouth of the St. Croix is about 230 miles, and that the cost of such a canal and its annual cost of maintenance would be not less than the amounts estimated for such a canal via the Brule and St. Croix route, stated by Maj. Sears at $6,012,500 and $350,000, respectively.

The advocates of this canal have submitted various estimates of the commerce which would move between the Duluth-Superior Harbor and points in the upper Mississippi River Valley. The latest of these estimates was submitted in connection with the statements of Mr. Armson. I have not a copy of this statement, but I shall refer to some of the estimates contained therein in a general way as I remember some of the most important tonnage items.

Mr. Armson also called attention to a pamphlet,[1] copy of which was filed, entitled "Report showing the commercial utility of proposed waterway," submitted to Lieut. Col. Graham D. Fitch, Corps of Engineers, May 31, 1909, by the Citizens' Association of Stillwater, Minn. I have a copy of this pamphlet

[1] Not printed.

before me and wish to call your attention to some of the weaknesses of the general scheme of gathering and presenting data which was followed, as well as pointing out incidentally some of the most glaring errors therein contained. After a careful reading of the entire pamphlet I am utterly unable to determine how the estimates of traffic presented were arrived at. There is no explanation of methods followed which would indicate that any special effort had been made to arrive at a conservative or accurate figure covering any commodity. There is nothing to support a conclusion that these estimates are better than the wildest kind of a guess. Of course, every citizen of Superior and Duluth takes pride in the magnificent showing made by the commerce of the Duluth-Superior Harbor, but in spite of discriminatory railroad rates, which have long operated to build up the Twin Cities in their northwestern trade at the expense of Superior and Duluth, it taxes the belief of the most credulous to state that "fully 75 per cent of this business is to and from St. Paul, Minneapolis, and other cities located on or tributary to the Mississippi" (pp. 12 and 13 of pamphlet). The report continues: "We present herewith a statement showing the receipts and shipments of a number of cities, as we have been able to gather them, regarding the bulk or heavy shipments of commodities which could be carried by canal at a considerable saving of freight rates." It is generally true that the larger the commercial center the more accurate are the figures obtainable representing the business transactions at that point. As an illustration of this rule it may be said that there is no accurate public record of the number of head and kinds of live stock shipped from each of the country shipping points to Chicago, South St. Paul, Sioux City, Kansas City, Omaha, or other large stock markets, but there is an accurate classified record of the receipts and shipments of stocks and animal products at each of these markets. It is conceivable that errors would naturally occur in arriving at the tonnage of machinery, canned goods, general merchandise, etc., received from or shipped to Superior and Duluth by Minneapolis, but it is very hard to account for any considerable error in stating the shipments of flour, mill stuffs, and oil cake—products for which Minneapolis is famed the world over.

At page 14 the shipments of these commodities from Minneapolis to Superior and Duluth are stated as follows for the year 1908:

	Tons.
Flour	708,351
Mill stuffs	129,503
Oil cake	11,865
Total	849,719

During the 12 months ending December, 1908, there were shipped by water from Duluth and Superior the following tonnages:

Flour.—Superior, 285,362 tons; Duluth, 143,628 tons; total, 429,990 tons.

The figures for shipments from Duluth and Superior are from Marine Commerce of Duluth-Superior Harbor, as compiled under the supervision of Lieut. Col. Graham D. Fitch, Corps of Engineers, then stationed at Duluth. As Minneapolis shipped 708,351 tons of flour to Superior and Duluth, and only 429,990 tons were shipped from Superior and Duluth, there were left for consumption in Superior-Duluth and vicinity 278,361 tons of flour. The population of Superior and Duluth, combined, in 1910, was 118,850 persons. If the 278,361 tons of Minneapolis flour, in excess of all lake flour shipments, were consumed in Superior and Duluth each inhabitant used 4,685 pounds of flour during 1908. If this tonnage were spread over Superior-Duluth and the "Iron Range," composed of Lake, St. Louis, and Carlton Counties in Minnesota, each inhabitant must have consumed 2,418 pounds of flour in 1908. The report goes on to state St. Paul's flour shipments to Superior-Duluth at 590 cars and says (p. 15): "This, of course, does not include shipments passing through in transit." Adding Stillwater's 1,500 tons of flour shipped to Superior-Duluth during the same time, and assuming that a small part of the other points mentioned sent a small quantity of flour and that country mills in Minnesota, North and South Dakota, other than those specifically named, also shipped flour to Superior-Duluth, truly it must be said that some of the flour went down the lakes in phantom ships which escaped the watchful eye of the United States engineer, or the people of Superior, Duluth, and vicinity were wonderfully well supplied with the "staff of life." Not showing a clear statement of the "theory" on which such figures as these are arrived at, I can not see how any value can be attached to such an erroneous statement. If

where the greatest accuracy could be expected there is manifest errors of such importance, what must be true of estimates coming from smaller cities where there is usually less effort to accurately record tonnage-movement figures?

There seems to be a tremendous confusion of thought in the minds of some persons residing at points along the Mississippi River when it comes to estimating tonnage available for shipment on the proposed canal. A few instances will suffice to illustrate this point. Burlington, Iowa, is said to receive some 30,000 tons of pig iron from the Lake Superior district at sixth-class rates. Freight shipments between the Lake Superior district and Burlington, Iowa, district are governed by the western classification, in which there is no sixth class. Sixth-class rates apply from points east of Chicago to Burlington, Iowa, and therefore if 30,000 tons of pig iron were received at Burlington on sixth-class rates that must have been the territory in which the shipment originated. The pig-iron production for Illinois (outside of the Chicago district), Michigan, Minnesota, Wisconsin, Missouri, and Colorado, in 1911, was 777,016 long tons, while the production in the Chicago district was 2,954,709 long tons for the same period as reported in Internal Commerce of the United States, published by the Bureau of Commerce and Labor. It seems hard to believe that shipments "from the Lake Superior district," which must be a small factor in pig-iron production as compared with Chicago, would move over the Lake Superior and Mississippi Canal and Mississippi River to Burlington, about 600 miles, when pig iron does not actually move in any volume from Chicago to Burlington via the Illinois and Michigan and Hennepin Canals and the Mississippi River, a distance of about 300 miles. This situation as to pig iron will not be materially changed by the completion of the Minnesota Steel Co.'s new plant at the Head of the Lakes, because there is no provision for casting pig iron at this large modern plant, where the molten metal will be carried directly from the blast furnace to open-hearth steel furnaces, only such ore being reduced as will be necessary for the steel-making requirements of the plant. Salt is shown as an item of tonnage of some importance, and in connection with this traffic it must be pointed out that the distance by lake from Michigan salt-producing points to Chicago is the same as or less than the distance from Michigan points to Superior, and that Chicago has long been an important salt-distributing point, yet La Crosse, Winona, Davenport, Burlington, and Keokuk do not receive salt from Chicago via the connecting canals and the Mississippi River. Why should we expect a traffic in this commodity to move from Superior to the same points of destination over a similar water route and through a longer average distance?

The secretary of the Davenport (Iowa) Commercial Club frankly says: "You know, of course, that we have a water route from Lake Michigan to Mississippi River via Illinois and Hennepin and Michigan Canals. While practically no use has been made of this waterway for through service up to the present time, the matter is receiving attention, and our shippers expect to receive substantial benefits from the same in the near future." One end of this canal is at Chicago, near the center of manufactures in the United States, and the other end touches one of the richest agricultural States in the Union, yet there is no substantial utility resulting from the expenditure of some $16,000,000 of public funds.

Among the many minor items of traffic said to be seeking a canal waterway to market, we find shipments of 45,000 tons stoneware and 70,000 tons of sewer pipe made at Red Wing, Minn. Sewer pipe and stoneware are very fragile commodities which are much better suited to continuous shipments over the smooth waters of a river and canal course than partly by canal, with the dangers of transfer, and partly by lake, subject to the rough-weather conditions often found on Lakes Superior and Michigan. This pamphlet says, "The sewer pipe and pottery is largely Chicago business and could be shipped advantageously and at a saving by an all-water route." The most complete refutation of this statement is found in the present existence of a suitable water route from Red Wing to Chicago, which is not used. Are we to conclude that this business would move north to Superior, be transferred there, and then proceed around "the Horn" via Lakes Superior and Michigan to Chicago, when it will not move by river and canal over a shorter route? If this is sound logic we may expect a tremendous growth in the traffic between New York and Seattle around Cape Horn after the opening of the Panama Canal.

What traffic, then, may be expected to develop on this canal?

LOCAL TRAFFIC ALONG THE CANAL ROUTE.

The Northern Wisconsin territory along the route of the canal is adapted especially to dairying, small fruit raising, and truck farming. Along the southern end of the canal dairying and potato raising are the principal farm occupations, while the small grains raised are largely rye and barley, which are produced in comparatively small quantities. In marketing the products of the dairy, small fruit or truck farm, everything depends upon quickness of delivery to point of consumption, so we could not expect such business to patronize the canal. The potato crop would not begin to move until about the time the canal season of navigation was over, so a very small tonnage would be derived from this source. The rye and barley raised finds its biggest market at Milwaukee, St. Louis, and the Southeast, where the largest breweries and distilleries are located. If a water movement of this traffic were to be expected at all, it would be south, via the Mississippi, through St. Louis. This statement would hold true for the coarse grains produced along the Mississippi in southern Wisconsin, southern Minnesota, Iowa, and Illinois.

OTHER TRAFFIC WHICH MIGHT USE THE PROPOSED CANAL, AND THE PROBABILITY OF SUCH USE IN VIEW OF RAILROAD RATES AND COMMERCIAL CONDITIONS.

GRAIN TRAFFIC.

For the reasons stated in the previous paragraph there would be no substantial movement of grain from grain-growing territory in Wisconsin, Minnesota, Iowa, and Illinois, lying adjacent to the Mississippi and south of St. Paul. The production is confined largely to coarse grains which do not usually seek a market through the port of Superior-Duluth, but in an opposite direction. The principal wheat-producing section lies west of Minneapolis and north of a line drawn due west from St. Paul, including central and northern Minnesota, northern South Dakota, all of North Dakota, and parts of Montana. From Montana and practically all of North Dakota and northern and northwestern Minnesota the freight rates on grain are the same to both Minneapolis and Superior. From South Dakota and southwestern Minnesota Minneapolis rates are from 2 to 4 cents per hundred less than the rates from the same points to Superior. In the larger part of the territory the differentials are 2 and 3 cents. The grain coming from this territory is largely wheat which is either milled at the Twin Cities going forward from that point as flour, is shipped from the Duluth-Superior harbor east by lake to be milled in consuming territory, or is milled in transit at small interior mills from which the product goes east to the larger consuming territory. Mills located at points south of the Twin Cities on the Mississippi either buy in the grain fields to grind in transit for Chicago territory, or east thereof, or would naturally buy from the Twin Cities to fill their requirements, as the rates into the Twin Cities are equal to or less than those to Superior, while the rates from the Twin Cities to the mill are less than from Superior. The price of No. 1 Northern is the same or higher in the Duluth-Superior market than at the Twin Cities, therefore grain purchased at Superior or Duluth would always cost the purchaser, at Winona or La Crosse, for instance, the difference in price if any between Minneapolis and Duluth plus the higher cost of transportation by rail or canal from Superior to the Twin Cities, as compared with the short rail or river haul from the Twin Cities to La Crosse or Winona. The situation here depicted holds true of other commodities originating at points along the Mississippi and destined to northwestern consuming points. For example, the rates from Superior-Duluth to Grand Forks, N. Dak., are the same as from St. Paul to Grand Forks. Pottery or sewer pipe from Red Wing, destined to Grand Forks would naturally go through St. Paul, because the local rail rate to St. Paul is less than to Superior-Duluth, or the Mississippi River to St. Paul would be used instead of the river and canal to Superior, because of the smaller expense for the short haul. Such classes of prospective traffic as this can not be said to demonstrate the economic necessity of a canal from the Mississippi to Lake Superior.

Grain, as stated before, comes to Minneapolis on the basis of a local rate which is: The same as the rate to Superior or from 2 cents a hundredweight, or 40 cents a ton lower to 4 cents a hundredweight, or 80 cents a ton lower than the rate to Superior. Grain coming from points where the shipments

route through the Twin Cities may be stopped at Minneapolis and offered for sale on that market and failing, such sale may be forwarded to Superior or Duluth on practically the same rate basis as if the shipment traveled through to destination without stopping in transit. Shipments coming from territory which would not route through the Twin Cities may be forwarded to Superior-Duluth at 5 cents a hundredweight, or $1 a ton more than the local rate to Minneapolis.

On the basis of a margin of 40 cents, 60 cents, 80 cents, or $1 a ton would grain move through Minneapolis via the Mississippi River and Canal to Superior or Duluth, if all proper charges were assessed against the traffic? The New York State canals would present conditions of operation similar to the proposed canal, having regard to the depth of water and type of barge.

Below we present some statistics which should throw considerable light on the fair operating cost of this canal.

Statistics for New York Canals from Census Reports on Transportation by Water in 1906.

Cost of proposed canal	$6,012,500
Interest per annum, at 3 per cent	180,375
Maintenance cost per annum based on Maj. Sears's report	350,000
Total interest and maintenance per annum	530,375
Number of tons required to pay interest and maintenance at 40 cents per ton	1,325,947.5
Number of tons required to pay interest and maintenance charged at 20 cents per ton	2,651,875
Total tons transported on New York canals	3,540,907
Tons of through freight on New York canals	1,006,414
Tons of way freight on New York canals	2,534,493
Wages of employees on New York canals	$726,402
Wages of employees per ton carried on New York canals ($726,402 divided by 3,540,907)	.205
Value of canal boats on New York canals	2,952,197
Interest on value of canal boats at 6 per cent	177,131.82
Interest on boats per ton carried ($177,131.82 divided by 3,540,907)	.05
Cost of elevation at Mississippi River per bushel, cents	.05
Cost of elevation at Mississippi River per ton, cents	15.65
Cost of elevation at Superior-Duluth harbor per ton, cents	15.65

The cost of elevation per bushel is based on the cost at Buffalo as stated on page 315 of the 1911 Statistical Abstract of the United States.

Cost per ton for interest on wheat delayed in transit (wheat at 90 cents per bushel and canal and river time estimated at 5½ days against 24 hours' rail transit), 2 cents.

The above estimate is for movement only and takes no account of probable delay in switching to elevator on the river or for delay in river transfer elevator due to congestion and irregularity of canal-boat traffic.

Cost of switching, if from Minneapolis local elevator, to river-front transfer elevator near St. Paul, based on switching charges in G. N. I. C. C. A 3140, per ton, 20 cents.

If from connecting line to St. Paul water front, through business, 10 cents per ton.

Cost per ton St. Paul or Minneapolis to Superior:

	If total tonnage moved were, 1,325,937.5 tons.	If movement were, 2,651,875 tons.
For interest on cost of canal and maintenance ..... cents..	40	20
Wages of employees	20.5	20.5
Interest on investment in boats	5	5
Cost of elevation at river	15.65	15.65
Delay in transit	2	2
Switching from connecting line to St. Paul water front on through business	10	10
	93.15	73.15
If from Minneapolis local, add 10 cents for switching [1]	10	10
	103.15	83.15

[1] Switching Minneapolis to St. Paul 20 cents per ton, as compared with interchange switch of 10 cents per ton.

It is apparent that under the above conservative statement of costs, which takes no account of insurance cost, higher wages for employees paid in the Northwest, as compared with New York or higher cost of materials for boats, as compared with the East, and extremely low estimated elevation charges at Buffalo, which probably could not be equaled on a less efficient plant handling a smaller business on the Mississippi water front at St. Paul, there could be no substantial movement of grain on the proposed canal from the Twin Cities to Superior.

WOULD FLOUR MOVE ON THIS CANAL?

The railroads owning docks at Superior or Duluth offer free storage for flour for lake shipment, which enables the Minneapolis miller to have a large amount of his product at the port to move at the opening of the lake season of navigation long before a similar amount of his products could be moved via the canal for early shipment. In addition to hastening the actual movement of his product, the placing of these goods in transit before the assessor gets around in the spring saves the taxes which would be assessed on these products if they were in the mill warehouse awaiting shipment via the canal. On anything like equal costs of movement via the canal compared with rail movement, the privilege of storage at railroads' docks and the opportunity to escape the spring assessment of taxes would give the rail route a very large proportion of the shipments. The lake-and-rail rate on flour from Minneapolis to eastern destinations is 5 cents per hundredweight, or $1 per ton greater than the lake-and-rail rate from Superior to the same destination. Using the figures previously given for grain and substituting a conservative estimate of 35 cents per ton for warehousing and handling from car to boat at St. Paul for the elevation charge previously shown, it appears that shipments moving via St. Paul rail and canal to Superior would cost from $1.04 to $1.24 per ton, if from Minneapolis local, or from 94 cents to $1.14 per ton if from points beyond. As before stated, these figures do not include anything for marine insurance and other proper charges.

The above estimates for handling flour are higher than rail costs, without charging a cent against the traffic for warehousing and handling at the Lake Superior destination. No substantial movement could therefore be expected.

COAL.

The United States Geological Survey production of coal in 1909 places the amount of coal mined and prices at mines as follows:

	Shipments.	Price per ton.
	Tons.	
Illinois	46,595,285	$1.05
West Virginia	43,946,303	.86

The largest volume of coal moving through the Duluth-Superior harbor is soft coal coming very largely from West Virginia. The rail rate on coal from a large group of Illinois points to St. Paul-Minneapolis is $1.40 per ton. Adding freight to average mine cost stated above, Illinois coal would sell on the St. Paul-Minneapolis market at $2.45 per ton plus storage, handling, and dealer's profits. The rail rate from a large part of the West Virginia coal mining territory to Lake Erie points when for lake shipment is 80 cents per ton. The lake rate from Lake Erie to Superior is 30 cents per ton, and the rail rate from Superior to St. Paul is 90 cents per ton. Mine cost 86 cents plus transportation expenses of $2 through Superior to St. Paul makes West Virginia coal worth $2.86 per ton plus cost of handling at Superior-Duluth docks (3 cents per ton, boat to dock plus 10 cents from dock to car), 13 cents would mean a total cost of $2.99 a ton at St. Paul plus storage and handling at St. Paul and dealer's profits. It is apparent that Illinois coal shipments directly limit the amount of Eastern coal, which can be sold at the Twin Cities. A reduction of 54 cents a ton in the rate from Superior to St. Paul would be necessary to make the cost of laying West Virginia coal down in St. Paul the same as the cost for Illinois coal. Reliable statements from coal-dock officials at Superior indicate that less than 25 per cent of the coal received at the Superior-Duluth harbor is shipped to St. Paul and Minneapolis. In general it may be said that the largest movement of coal from Superior and Duluth docks does not take place until about what would be the close of a canal season of navigation, which would reduce very materially the tonnage available for canal shipment. The present system of handling the coal business is based on the storage of tremendous coal supplies at Superior and Duluth and shipment to retailers and manufacturing plants at times which suit their convenience and allow plants to keep their current investment in fuel down to the lowest possible point. In order to ship coal by canal to the Twin Cities, it would be necessary to make large coal-stock piles at or near St. Paul on the Mississippi River. The necessity for keeping various advertised individual kinds of coal separate and the small volume of each concern's business handled at such points would not warrant the installation of expensive handling machinery to transfer coal shipments from the barges to the dock and from the stock pile to cars. In loading coal by hand from stock pile to car a cost of from 30 cents to 40 cents per ton is incurred for handling. This is the experience of operators of Superior coal docks. If to this handling charge we add something for return on barges, wages of canal employees, and switching from stock pile on the Mississippi to points in St. Paul or Minneapolis, it must be apparent that no substantial saving under present rail rates would be effected. In addition to the items of cost already mentioned, something would necessarily have to be added for rent of dock space or land on the Mississippi River, as well as losses due to additional handling received by the coal. That losses from handling coal are substantial is attested by the fact that coal docks located at Superior have installed the largest briquetting plants in the United States, if not in the world, to put coal screenings and dust in marketable form. It is confidently stated that the most thorough investigation will fully substantiate what has been said above, and it is our sincere belief, therefore, that the estimated traffic in coal, grain, and flour would not materialize.

As to iron and steel goods, canned goods, sugar, salt, and cement from eastern points of production it is only necessary to point out that the present lake and rail rates to the Twin Cities are but 2 cents per hundredweight, or 40 cents per ton, more than the rate to Superior and that a certain amount of free storage in transit is allowed on the Twin City business. The 40 cents per ton difference would not go far to provide for handling charges at St. Paul and switching from docks to warehouse, to say nothing of the free-storage privilege which would be lost to manufacturers or jobbers.

What, then, is the reason why people of the Twin Cities and immediate vicinity wish to see this canal built? The Twin Cities have long been the beneficiaries of a system of discriminatory lake-and-rail rates. Communities on all sides of them, including Kansas City, Sioux City, Mankato, Albert Lea, and Red Wing, have complained to the Interstate Commerce Commission of such discriminations. There is now pending before the Interstate Commerce Commission a complaint of the Duluth Commercial Club against these unjustly discriminatory rates. A canal from Lake Superior to the Mississippi River would give theoretical or "potential" water competition which would go far to justify and perpetuate the iniquitous system of rates which now exists.

Some of those who favor this canal have contended that the canal would "regulate" freight rates. Ever since February 4, 1887, and more especially since the passage of the Hepburn and Mann-Elkins laws of 1906 and 1910, the Federal Government has taken the position that railroad rates and fares can and must be regulated by an administrative body clothed with adequate powers to investigate and decide such questions.

If the communities interested in the building of this canal are not receiving fair treatment at the hands of rail or rail-and-lake carriers they should seek redress through the Interstate Commerce Commission, not through the expenditure of some $6,000,000 or more of public funds, which might not prove efficient in either regulating rail rates or serving commerce, as would seem to be the case with the Illinois-Michigan-Hennepin canals connecting Lake Michigan and the Mississippi River. All of which is respectfully submitted.

Yours, very truly,

J. A. LITTLE, *City Statistician.*

Lieut. Col. CHAS. L. POTTER,
Lieut. Col. FRANCIS R. SHUNK,
Capt. E. D. PECK,
Corps of Engineers.

APPENDIX D.

LETTER OF THE PUBLIC AFFAIRS COMMITTEE OF THE COMMERCIAL CLUB OF DULUTH.

DULUTH, MINN., *January 23, 1913,*

DEAR SIR: In considering the commercial possibilities of a canal from Lake Superior to the Mississippi River, it seems proper and fair to take up the movement of various commodities between Duluth-Superior Harbor and the Twin Cities, both locally and destined to points beyond, the volume of such movement in total, and during both the open and closed seasons of navigation upon the canal, the railroad rates for the transportation of such commodities, the service performed by the railroads as compared with that which might reasonably be performed by the canal, the railroad rates for such transportation, and the possibility of rates being made for transportation on the canal low enough to attract traffic from the rail lines and affect the rail rates.

As the southbound movement will probably considerably exceed the northbound shipments in the future, to at least as great an extent as at present, consideration will be given to that traffic first.

COAL MOVEMENT.

For the season of 1911 there were received by lake at Duluth-Superior Harbor 1,364,568 tons of hard coal and 7,070,337 tons of soft coal.

Hard coal is used mainly for house heating during the winter months, and the shipments from the head of the Lakes move almost exclusively during the late fall and winter, when the canal would be closed to navigation. It therefore seems fair to eliminate the hard-coal tonnage, unless it can be shown that the rates on the canal can be made low enough to warrant the shipping, prior to the close of the canal, of large quantities for storage at the Twin Cities or other points. This feature will be taken up later.

Soft coal is used the year round, but a much greater tonnage is consumed during the winter months than during warm weather, as this class of coal is used largely in the heating of large buildings, and even steam plants require more fuel during the winter than in the summer.

Presuming for purposes of argument that the demand is uniform throughout the year and the shipments each month are about equal, the largest estimate presented at the hearing was that 50 per cent of the receipts at Duluth-Superior Harbor goes to the Twin Cities and beyond. Fifty per cent of the 1911 receipts of soft coal was 3,535,168 tons, equal to 294,597 tons per month. The canal would not be open for traffic over seven months in the year, and for that period 2,062,179 tons would move under normal conditions. This movement, like that of hard coal, is dependent upon the canal rates and service.

SERVICE.

Coal transported by rail is loaded into cars at the docks at the head of the Lakes and delivered next day to consignees in any part of the Twin Cities without any additional charge beyond the freight rate from Duluth to St. Paul. Shipments by canal would have to be unloaded and loaded into cars for delivery at points of destination not located on the canal. Coal transported by canal could not be delivered to consignees in the Twin Cities in less than five days on the average.

The price of coal f. o. b. cars at Duluth is 25 cents per ton less than the price of the same coal f. o. b. barges at Duluth. The deterioration on coal in the transfer from barges to cars is estimated by the coal-dock managers at Duluth-Superior Harbor to be about 20 cents per ton. The charges at the Twin Cities

for moving coal from the canal terminals to industries or team tracks would be, on a distance tariff basis, as follows:

	Miles.	Rate.
Cents per 100 pounds	5	3
Do	10	3
Do	15	3
Do	20	4
Do	25	5
Do	30	5
Do	35	6
Do	40	6

The rates from the canal terminal to destinations on rail lines would depend upon the location of the canal terminals.

To sum up, the cost of delivering coal from Duluth to on board cars at the canal terminals, exclusive of the charge for transportation on the canal, would be substantially as follows:

	Per ton.
Extra charge for loading barges	$0.25
Deterioration	.20
Transfer barge to car	.15
Total	.60

The rail rates from Duluth to the Twin Cities are $1.25 per ton on hard coal and 90 cents per ton on soft coal, leaving 65 cents per ton on hard coal and 30 cents per ton on soft coal to cover the canal charge from Duluth to the Twin Cities and the rail charge from the canal terminal to final destination in the Twin Cities.

From this it would seem doubtful if the canal could equal the rail rates, and practically impossible for the canal to offer rates enough lower than those of the rail lines to attract any considerable tonnage for the Twin Cities locally.

As to coal traffic from Duluth destined to points beyond the Twin Cities which might move by canal, the rail rates from Duluth to such destinations are substantially the same as the rates to the same points from Lake Michigan ports and from mining points in Illinois. The following table shows the rates from Duluth to representative points beyond the Twin Cities and the local rates from St. Paul:

Rates per net ton.

To—	Through rate.		Local from St. Paul.	
	Soft.	Hard.	Hard and soft.	Hard.
Rochester, Minn	$1.40	$2.25	$2.00	.....
Waseca, Minn	1.40	2.00	1.60	.....
Owatonna, Minn	1.40	2.00	1.80	.....
Austin, Minn	1.40	2.00	2.00	.....
Mankato, Minn	1.50	2.05	1.60	.....
New Ulm, Minn	1.80	2.05	1.60	.....
Pipestone, Minn	2.00	2.25	1.85	$2.15
Sioux Falls, S. Dak	2.40	2.50	1.25	2.50
Huron, S. Dak	2.55	2.80	2.15	2.35
Aberdeen, S. Dak	2.55	2.80	2.55	2.80

MERCHANDISE.

Westbound general merchandise traffic destined to the Twin Cities is handled on through rates, which are the following differentials higher than the rail-and-lake rates to Duluth, governed by official classifications:

Classes	1	2	3	4	5	6
Cents per 100 pounds	15	13	9	5	4	2

Iron and steel articles, 2 cents.
A very large percentage of special commodity rates, 2 cents.
The canal boats could not reduce these figures and live.
The lumber manufactured in Duluth is shipped east by lake.
This is substantially of the southbound traffic.

NORTHBOUND.

The claim has been made that flour, grain, and manufactured articles will furnish a heavy northbound tonnage.

The mills at Minneapolis are located above any possibility of navigation on the Mississippi River, so far as the proposed canal is concerned, therefore there will be a rail movement from the mills to the canal. The transfer, estimated from the experience at Duluth in unloading from cars and loading on board vessels, would be 30 cents per ton. The same charge would be made at Duluth for transferring from barge to lake vessels. This would make a charge of 60 cents per ton for handling alone. The proportional rate on flour by rail from Minneapolis to Duluth is 5 cents per 100 pounds, or $1 per net ton. Deducting the canal handling charges, leaves 40 cents per ton out of which to pay the rail charges from the mills to the canal and the charges for canal transportation to Duluth.

Flour and package freight can not be handled to advantage in the same type of barge as coal and other bulk commodities, and a coal barge would have to be thoroughly cleaned before loading with flour.

Grain is not shipped locally from the Twin Cities to Duluth. Such grain is handled on a proportional rate not exceeding 5 cents per 100 pounds, or $1 per ton. The bulk of the grain moving from Minneapolis to Duluth is handled on through rates from points of origin to Duluth.

The through rates from points on the Great Northern Railway in southwestern Minnesota, Iowa, and South Dakota to Duluth in no case exceed the rates from the same stations to Minneapolis by more than 3 cents per 100 pounds, or 60 cents per net ton.

In order to attract grain shipments to the canal, a rate materially lower than 60 cents per ton would have to be made between Minneapolis and Duluth. Grain could not be handled in a coal barge unless the barge was subjected to a thorough cleaning before the grain was loaded. The elevators in the Twin Cities are not located so as to load direct to barges. This would necessitate a rail movement from elevator to barge and a transfer charge of at least 20 cents per ton from car to barge.

On all merchandise traffic through Duluth, both east and west bound, there is a dockage charge of 40 cents per ton, which is absorbed by the rail lines. Some arrangement would have to be made by the canal boats to take care of this charge.

All of the rail rates include insurance against loss and damage. The matter of claims has not yet been referred to, as it does not seem necessary to go further into details in view of the impossibility of the commercial success of the canal.

The rail rates are so adjusted and the transportation conditions so unfavorable to canal traffic that there seems to be very little possibility of rates being made on the canal, which, added to the various charges incidental to transportation via that agency, would meet the rail charges, and no possibility of canal rates being made low enough to influence the movement of traffic by rail or affect the rail rates.

All of which is respectfully submitted.

Yours, very truly,

G. Roy Hall,
Traffic Commissioner.

Capt. E. D. Peek,
Corps of Engineers.

APPENDIX E.

LETTER OF THE CITIZENS' CANAL COMMITTEE IN THE MATTER OF THE PROPOSED LAKE SUPERIOR-MISSISSIPPI CANAL.

SIRS: In response to your circular letter of November 19, 1912, requesting information from interested persons on the character, amount, and value of commerce that would be affected directly or indirectly by the proposed canal connecting Lake Superior with the Mississippi River, the St. Croix River Improvement Association and the Citizens' Association of Stillwater, Minn., appointed the undersigned committee to gather such data as might be available, and to compile and submit the same to you for your information.

In the circular letter above referred to information was particularly desired on the following points:

(*a*) The present and prospective business of the locality in character and amount, development of water power, etc., and particularly the kind and amount of vessel commerce and present facilities for conducting the business.

(*b*) What kind of improvement is desired by those who caused the above items to be inserted in the river and harbor bill.

(*c*) With reference to the proposed canal, the character and amount of commerce and its value that would probably be carried by the proposed canal, or that would be affected directly or indirectly by it; the extent to which it would probably promote the general business or industries in any localities or sections of the country, and any other data which might have a bearing upon the question in hand.

SUBDIVISION A.

The information requested in subdivision (*a*) in reference to the present and prospective business in character and amount of the localities that would be affected by the proposed canal will be included in our response to the questions contained in subdivision (*c*).

In the matter of the development of water power, this committee is unable to submit any reliable data on this subject for the reason that no survey of the proposed canal route between Lake Superior and the St. Croix River by way of the Amnicon and Moose Rivers has yet been made, and until at least a preliminary survey is made, it would be impossible to report on the probable water power that could be developed on these rivers.

It was conservatively estimated that more than 50,000 horsepower could be developed on the route by way of the Brule River and Upper St. Croix Lakes surveyed under direction of Maj. Clinton B. Sears, Corps of Engineers, in 1895, but we are unable to say whether the amount would be greater or less on the Amnicon-Moose River route.

In reference to the kind and amount of vessel commerce and the present facilities for handling the same, we assume that this question refers more particularly to the Duluth-Superior Harbor, upon which we have no information to offer.

SUBDIVISION B.

The improvement desired is a barge canal. The width and depth of such a canal is entirely an engineering matter. Maj. Sears's estimate of the cost of such a canal was based on a width at the water surface of 80 feet, 59 feet wide at the bottom, and 7 feet deep. It has been suggested that a depth of 8 feet would add greatly to the carrying capacity of the canal. Upon this subject, however, we have no suggestions to offer, but simply call attention to the suggested depth of 8 feet.

SUBDIVISION C.

In a report submitted to Lieut. Col. Graham D. Fitch, Corps of Engineers, under date of May 31, 1909, by a committee of the Citizens' Association of Stillwater, Minn., a copy of which is hereto attached,[1] the character and amount of commerce that would probably be carried by the proposed canal, and the probable effect it would have on freight rates was covered in considerable detail. The data submitted at that time has been revised and brought down to date by the present committee, a summary of which is herewith attached for your information.

The territory that would be affected, either directly or indirectly, by the building of the proposed canal embraces practically all of the five States bordering on the Mississippi River—Minnesota, Wisconsin, Iowa, Illinois, and Missouri. These States contain a population of more than $16,000,000 people and have an area of 310,815 square miles. They are among the most prosperous and progressive States of the Union. The varied resources and wonderful fertility of the Mississippi Valley justifies the opinion that eventually it will be one of the greatest and most populous sections of our country. It is not unreasonable to estimate that these States will have a population of at least 25,000,000 people within the next 20 years.

During the past 20 years the industrial and commercial growth of the Mississippi Valley has far outstripped its growth in transportation facilities. This unequal growth has resulted in frequent freight congestion in the commercial centers of the Middle West in recent years and has adversely affected our industrial development. It is highly improbable that these congested conditions will be relieved by increased railroad facilities in the near future. An eminent railroad authority, Mr. James J. Hill, estimated a short time ago that it would take $5,000,000,000 to furnish the railroads of the country with adequate facilities in trackage, terminals, and rolling stock to enable them to properly care for the traffic of the country.

These conditions make it imperative that we should utilize our waterways for transportation, especially for the transportation of heavy and bulky commodities. It is estimated that it would take $500,000,000 to put all the principal waterways in condition for profitable steamboat and barge transportation—just one-tenth of what Mr. Hill says is needed for perfecting the railroad system. It is possible that by the time that Mr. Hill's $5,000,000,000 was expended on railroads, traffic will again have so increased as to demand a yet further laying of tracks and expansion of terminals, while waterways once constructed admit of indefinite expansion of traffic without enlargement.

It is not necessary, however, to dwell on the economic value of waterways in the development of the industrial and commercial welfare of a country. Such value is now generally recognized by every thoughtful student of transportation problems. In considering any comprehensive scheme of waterways development, however, the value of each specific project must in the end be determined by its commercial utility. It is our purpose, therefore, to present in this report certain facts and data bearing on the commercial value and utility of the proposed canal connecting Lake Superior with the Mississippi River.

We believe that such a canal would be of immense value to the entire Upper Mississippi Valley, as well as the adjacent territory. The cheaper freight rates afforded by water transportation as compared with rail would greatly stimulate trade and commerce and would aid materially in our industrial progress. The saving in the cost of transporting such heavy articles of commerce as coal, iron, lumber, cement, lime, salt, sugar, heavy hardware, and building and crushed stone would alone justify the building of such a canal.

As coal and iron constitute the greater part of the cost of a large and growing line of manufactured products, and as the future industrial growth of the Mississippi Valley will depend largely on the availability and cost of these commodities, the value of the proposed canal as affording the cheapest possible method of transporting these important articles of commerce will be first considered.

In the territory tributary to the proposed canal the consumption of coal is conservatively estimated to exceed 10,000,000 tons annually. The receipts of coal in the Duluth Superior Harbor alone in 1911 exceeded 8,500,000 tons. At least 60 per cent of the latter is shipped to the Mississippi and Minnesota River Valleys. The present rail rate to St. Paul and Minneapolis is $1.25 for hard

[1] Printed in H. Doc. No. 304, 61st Cong., 2d sess.

and 90 cents for soft coal, while the rate to points in the Minnesota Valley is the Twin City Rate plus the local rate. It will be generally conceded that canal transportation would not only affect a considerable saving in freight charges from Duluth to down-river points but would also effect a considerable saving in rail rates on coal from Illinois because of competition.

Assuming that 50 per cent, or 5,000,000 tons, of the total coal consumption would be affected by canal transportation or canal competition to the extent of 40 cents per ton, the saving in freight charges on this commodity alone would amount to $2,000,000 annually.

It is difficult to obtain any accurate data as to the quantity of manufactured and pig iron shipped into this territory. A careful estimate places the amount at 1,500,000 tons annually. A saving of 40 cents per ton on freight charges would amount to $600,000 per year on iron shipments.

But the benefits of a canal, in so far as it affects the shipment of iron products, is of much greater future importance than present shipments would indicate. When the large steel plant now in course of construction at Duluth is completed, the head of the lakes will become one of the great distributing points for iron-ore products. More than 1,400,000,000 measured tons of iron ore were reported for taxation in Minnesota in 1912, and there are still thousands of acres of the ore belt that have not yet been explored, so that it is safe to say that the ore deposits of the State will be ample to meet the needs of this immense steel plant for more than 100 years to come. This means that for the next century millions of tons of iron-ore products will be shipped annually from Duluth to points in the Mississippi Valley and tributary territory.

The proposed barge canal would permit of the shipment of pig and manufactured iron to points on the Mississippi at less than half the present cost of shipping by rail and would greatly stimulate the industrial development of every manufacturing city in the Mississippi Valley.

In addition to coal and iron there are many other commodities that could be shipped by canal to points on the Mississippi for consumption at such points or for distribution to interior points at a considerable saving in transportation charges. The shipments into the canal districts of salt, cement, lime, sugar, and other articles of heavy merchandise that could be profitably shipped by water aggregate fully 1,500,000 tons annually. A saving of 60 cents per ton on these commodities would mean an annual reduction in freight charges of $900,000.

While the water power that could be developed by the building of the necessary locks and dams in the construction of the canal, by way of the Amnicon-Moose River route can only be conjectured; if such power equals the power on the Brule route it would approximate 50,000-horsepower. Assuming that this amount of power could be utilized in the operation of the canal and for commercial purposes and sold at the very low average of $20 per horsepower, it would represent an annual income of $1,000,000. It is not improbable that in the near future electricity will not only be the motive power in factories, but will take the place of steam on many of the railroad systems of the country. When that time comes, the value of the horsepower that could be developed on the proposed canal route would be enhanced many fold. The development of the water power is one of the important benefits that will accrue from the building of the proposed canal.

Summarizing the above items, we get the following results as representing a net annual saving in freight on these commodities, to which is added the estimated income from water power:

Coal	$2,000,000
Iron	600,000
Salt, cement, sugar, etc	900,000
Water power	1,000,000
Total	4,500,000

The above estimate does not include many other articles of commerce upon which freight rates would be materially reduced because of cheaper water transportation, such as lumber, brick, crushed rock, building stone, flour, grain, and other agricultural products, the aggregate of which would amount to hundreds of thousands of dollars annually, not alone because of the cheaper cost of water transportation but also because canal rates would have a decided influence in preventing excessive rail rates.

Assuming the cost of the proposed canal to be $10,000,000 and the annual cost of maintenance at $350,000, the four items given in the above table would represent an annual return of 41.5 per cent on the investment.

Taking up the present necessity of the proposed canal, we are aware of the adverse report on the commercial value of the undertaking made by Maj. Sears in his report of 1896 and in his supplementary report of 1899. Both reports pointed to the fact that three lines of railway almost parallel the proposed canal and afforded adequate shipping facilities at that time. These conclusions were probably justified by conditions at that time, especially if facility, rather than cheapness, is to be the determining factor in transportation problems. But conditions have undergone great changes in the Middle West in the past 15 or 20 years. The development of the upper Mississippi Valley during that period has been simply marvelous. Its growth in population, in agriculture, in commercial and industrial activities has brought us face to face with transportation problems that did not exist 20 years ago.

Perhaps no better illustration of the rapid industrial and commercial growth of the Middle West could be given than by comparing the vessel tonnage, the freight tonnage, and the tonnages of certain raw and manufactured materials passing through the Soo Canal in 1894 and in 1910. The following figures are compiled from the Monthly Summary of Commerce and Finance, issued by the Department of Commerce, December, 1911:

Growth of Soo Canal traffic, 1894–1910.

	1894	1910	Increase.
			Per cent.
Vessel tonnage	13,110,366	49,856,123	280
Freight tonnage	13,195,860	62,363,218	373
Coal, tons	2,797,184	13,513,727	383
Iron ore, tons	6,548,976	41,603,634	535
Manufactured and pig iron	60,659	444,669	633
Unclassified freight	415,180	1,411,549	240

These figures afford some index to the marvelous commercial growth of the Middle West in recent years. The greater part of the tonnage passing through the canal upward reaches the head of Lake Superior and is distributed in northwestern Wisconsin, Minnesota, and North Dakota, while the tonnage downward originates mainly in Minnesota, two-thirds of the total being iron ore. While there will be a substantial decrease in the ore shipments when the steel plant is completed at Duluth, there will be a corresponding increase in manufactured products to be distributed in the Middle West when this plant is in operation.

The commerical value and utility of a canal connecting the Great Lakes with the Mississippi River will be greatly augmented with the opening of the Panama Canal. It would afford an outlet by water for the commerce of lake ports destined for Pacific coast points, thus enabling such ports to better compete with Atlantic coast ports—something they will be unable to do if they are obliged to reach the Pacific coast by rail. Unless the Middle West utilizes the Mississippi and its tributaries in connection with the Panama Canal for shipping and receiving Pacific coast freight, it will find itself greatly handicapped in the race for commercial supremacy—perhaps for its commercial existence.

The East should not be permitted to dominate the trade that will pass through the Panama Canal. But unless the Middle West takes note of what is transpiring and prepares to meet the situation it will awake to find that its hope of commercial greatness was but a dream. The serious situation of the Middle West is greatly intensified by free tolls through the Panama Canal for coastwise steamers. It is imperative to utilize our waterways to the fullest possible extent to meet the situation that now presents itself. The proposed canal will constitute the connecting link between the Great Lakes and the Pacific Ocean. It will give us an outlet by water for our inland commerce, thus enabling us to successfully compete with the East. It will give us a continuous waterway from the Atlantic to the Pacific through the heart of the continent, thus bringing us into water communication with the entire world.

As a basis for calculation as to the present volume of commerce between the St. Croix and the Mississippi River points and the East via the Duluth-Superior Harbor, the so-called lake-and-rail route, we have secured some statistics showing the receipts and shipments from the Duluth-Superior Harbor as shown in the Annual Report of the Chief of Engineers, United States Army, to the Secretary of War for the year ending June 30, 1912; also as shown in the Monthly Summary of Commerce and Finance of the United States, and also from the associations of commerce of various cities.

Estimates given us by shippers, railroads, and other sources of information show the receipts at the Duluth-Superior Harbor for year ending June 30, 1912, to be 9,765,346 tons. From reliable information it is shown that approximately 60 per cent of the receipts at the Duluth-Superior Harbor come to St. Paul, Minneapolis, and the Minnesota Transfer, making 5,859,207 tons to these points. The foregoing figures do not include lake-and-rail business to St. Paul, Minneapolis, and other river towns from Lake Michigan ports—Chicago, Milwaukee, Manitowoc, Green Bay, etc.—which are very considerable, but for which we have no statistics.

As to shipments from St. Paul, Minneapolis, and the Minnesota Transfer to the Duluth-Superior Harbor, it is shown by the report of the Railroad and Warehouse Commission of Minnesota, and from other sources, that over 600,000 tons of flour and approximately 400,000 tons of other commodities are shipped from St. Paul, Minneapolis, and the Minnesota Transfer to the Duluth-Superior Harbor each year.

Of the 5,859,207 tons of freight received at St. Paul, Minneapolis, and the Minnesota Transfer and 1,000,000 of freight shipped to the Duluth-Superior Harbor, it is fair to assume that 50 per cent or 3,429,603 tons would be shipped by way of the proposed canal at a saving of about 50 cents per ton, making a saving of $1,714,801 annually.

We have no data, nor is it possible to estimate the enormous amount of freight, particularly general merchandise, which through a lowering of the freight rates would be brought by way of the proposed canal from the eastern markets on boats which go East loaded with iron ore and whose owners are very desirous of securing ballast for return trips at very low rates, i. e., imported and domestic merchandise which now comes into this market over the railroads from the southeast and which in the event of the proposed canal would come through the Duluth-Superior Harbor, thence by way of the canal to jobbers and manufacturers of the Northwest.

The proposed canal line from Duluth-Superior Harbor to the Twin Cities on the Mississippi River is in fact only an extension of the Erie Canal. Gathering products of the Western States, delivering them at the Duluth-Superior Harbor, to be shipped by larger boats to Buffalo and Erie Canal ports.

Maj. Sears in his report recommends a canal of 7 feet draft, but as the Erie Canal is 12 feet deep we would suggest that a canal 10 to 11 feet would be more serviceable. Barges could often be loaded from large boats direct, thus saving one transfer. There is no doubt but that the lake traffic would receive a strong impetus by the building of this canal and the completion of the improvements of the Erie Canal.

FUTURE DEVELOPMENTS.

The immense resources of the St. Croix and the Mississippi Valleys call to mind the great benefit which would be derived by the construction of this canal. It is well known that for miles on each side of the St. Croix River the soil is particularly adapted to the raising of potatoes, grain, and other farm produce, many thousands of carloads of potatoes being shipped to eastern and southern markets each season. It is also a well-known fact that during the past season the railroads traversing this territory were incapable of handling the crop, due to lack of cars and other causes. Also it is well known that the price of potatoes was about 100 per cent higher in St. Louis and other Mississippi points than at points on the St. Croix River, due to heavy freight charges and for storage charges while waiting for cars at shipping points. Therefore it would not only be of tremendous advantage to the farmers in the territory adjacent to the proposed canal but also to thousands of families in the Eastern and Southern States.

The geological survey of the territory adjacent to the proposed canal shows vast deposits of trap rock, which would develop great crushed-rock industries; lime rock, which would develop lime kilns; building stone, which at present lays

dormant owing to lack of cheap transportation facilities; pottery clay deposits, which would develop brick industries; filter sand, which is coming into greater use each day, but which is now left as deposited by nature; silicate sand, for glass manufacture and other industries, which would be greatly developed for the benefit not only of this section but that of the entire Nation.

In compiling the data relating to the proposed Superior-Mississippi Canal the committee has endeavored to secure the most reliable information possible, and we have therefore referred to the Annual Report of the Chief of Engineers, United States Army, to the Secretary of War for the year ending June 30, 1912. We quote from pages 953, 954, 955 the following, which is pertinent to the question in hand:

"It is well known that the railroads strive keenly for the north-and-south freight business, make lower rates where there is water competition, cut their rates on certain commodities, and make sometimes especially low rates for the season of navigation, to be increased during the winter months. This latter practice was common several years ago."

Also from the same authority we quote: "It is believed the tonnage of the Duluth-Superior Harbor is new exceeded by that of but one port in the United States—New York."

Also, from the same authority we quote: "The vessel freight of the Duluth-Superior Harbor for 1911 was 57 per cent of the amount which passed through the Sault locks the same year."

Also, from the same authority: "Improvements of the Duluth-Superior Harbor from 1867 to June 30, 1912, is $6,869,741.02, and the freight received and shipped during the same period 365,865,859 short tons and the market value of the same $3,855,394,224. From this it appears that the cost of the Government improvements has been about one-sixth of 1 per cent of the value of the freight transported.

In conclusion, this committee desires to express its regret that the examination of the canal route seems to be confined to the Aminicon and Moose Rivers. We had hoped that your instructions might have been sufficiently broad to permit of the examination of different suggested routes in order to determine the most feasible one.

If the Aminicon-Moose River route should be found impractical because of insufficient water supply or serious engineering difficulties, we would ask that you recommend an examination of other suggested routes in order to determine their feasibility.

Respectfully submitted.

CITIZENS'S CANAL ASSOCIATION,
J. G. ARMSON.
C. W. BRENNER.
H. H. HARRISON.
WM. SMITHSON, *Secretary.*
W. C. MASTERMAN.

THE BOARD OF ENGINEER OFFICERS,
Duluth, Minn.

SUPPLEMENTAL REPORT ON WATERWAY FROM LAKE SUPERIOR TO THE MISSISSIPPI RIVER.

UNITED STATES ENGINEER OFFICE,
Duluth, Minn., July 7, 1915.

From: Board of Engineer Officers.
To: The Chief of Engineers, United States Army.
Subject: Supplemental report on waterway from Lake Superior to Mississippi River.

1. Complying with first indorsement, dated Office Chief of Engineers, Washington, September 18, 1914, on letter from the Board or Engineers for Rivers and Harbors, the board of officers of the Corps of Engineers constituted by Special Orders No. 19, War Department, Office of the Chief of Engineers, Washington, August 14, 1912, submits the following supplemental report.

2. The appellant before the Board of Engineers for Rivers and Harbors appears to be made up of a commission from the State of Minnesota and another from the State of Wisconsin. In all cases in this report they will be referred to as the commissions. Since the commissions' appeal is made in two documents,[1] one called "General data" and the other "Supplemental data," the former will be designated "G. D." and the latter as "S. D." after the heading or the number of the paragraph wherever reference is made to the matter put forth by the commissions.

3. As considerable differences appear to exist between the board's statements and the views of the commissions, it is believed to be desirable to review in general the two documents submitted by them.

4. *Length of canal (par. 2, G. D.)*—The "General data on Lake Superior-Mississippi River Canal," published on page 2 of House Document No. 920, Sixty-third Congress, second session, was not a part of the board's report, but information handed to the commissions' representative, when the latter was given an opportunity to review the report. The distance from the Duluth Canal to the mouth of St. Croix is more accurately 221 miles instead of 222, as stated therein. The commissions' claim that the distance should be calculated from the junction of the canal with Allouez Bay is a matter of opinion. This junction is nearly 2 miles from the nearest water in the harbor deep enough to float a lake vessel and the same distance from the nearest commercial dock of any kind. The board considered the haul from Minneapolis to Duluth-Superior as 260 miles, whereas the commissions believe it should be 250. The following facts pertain:

The distance from Minneapolis to deep water in Duluth-Superior Harbor is nearly 252 miles.

The distance to Superior Harbor Basin is nearly 253 miles.

The distance to the Duluth Harbor Basin is about 260 miles.

The average distance to all coal docks in Duluth-Superior Harbor is about 259 miles.

The average distance to all grain elevators in Duluth-Superior Harbor is about 258 miles.

The average distance to all general merchandise docks in Duluth-Superior Harbor is 259 miles.

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[1] See page 97 for "General data," and page 181 for "Supplemental data."

The distance to the Zenith Furnace is 262 miles.

The distance to the United States Steel Corporation's plant is 270 miles.

It therefore appears that 260 miles is approximately correct.

5. *Report of local board founded upon artificial and preventable obstacles* (*paragraph 9, G. D.*).—The board's report is founded on conditions as they exist, and not on conditions which may exist after legislation has been had to compel the railroads to do certain things and to prevent their doing others. What conditions may exist four, six, or eight years hence the board can not predict. Its conclusion, as to whether a canal is or is not now commercially feasible, must be based on present conditions. Certain freight rates now exist. If they are tending to increase, that is only in unison with all other expenses, and their increase must be followed by that of water rates unless other conditions in some way help the water rates.

6. *Decadence of inland waterways and canals* (*paragraph 11a, G. D.*).—The general decadence of traffic on our inland waters is well known. It does not follow, however, that the only inference possible is that traffic thereon is no longer profitable or practicable; that all inland waterways are unworthy of improvement; or that railway transportation is cheaper. The failure to use inland waters as transportation routes is a fact—even, in many cases, where such transportation is cheaper. This may change in the near future, but it has not changed yet. The commissions' Exhibit III (G. D.) is quoted at length to show the great saving by the use of the Monongahela River by Jones & Laughlin, a coke firm which uses 2,000,000 tons of coal per year, and transports it from mine to plant at 10 cents per ton, at a saving of 25 cents per ton over railroad rates. This transportation is from the company's own mines, by its own steamers and boats, to its own plant. Two quotations, very pertinent to the general use of inland waterways, appear in paragraph 6 of the same exhibit: "As a matter of fact but little attempt is made by the railroads in the Monongahela Valley above Pittsburgh to compete in the local markets with the boats for home trade." Water transportation is so cheap that the railroads can not meet the rates. This appears an ideal case where water transportation has won out and defeated the railroads; and yet: "As for local rail rates they are very high as compared with river rates in the Monongahela Valley, nevertheless in this city (Pittsburgh), owing very largely to its topography, much the greater part of the local demand is met by the railroads." The two cases cited by the commissions, where large firms are using their own fleet for transporting their own coal, apply to users of 2,000,000 (paragraph 25e, G. D.) and 1,000,000 tons (paragraph 30, G. D.), respectively. At the same time and in the same territory the small manufacturer and the household consumer is paying the rail rate. It is not considered probable that any consumer will be found in St. Paul or Minneapolis who will own his own transportation lines from Duluth, and who will deliver, into his own plant, an immense quantity of coal such as is used by Jones & Laughlin or the Crucible Steel Co. The board is not attempting to disparage the use of waterways by such companies, and willingly accepts the fact that their use of this cheaper transportation is a public benefit, justifying large expenditures on the waterways and reducing the price of the product to the people. These conditions, however, do not appear applicable to the Twin Cities.

7. As to the difference in the figures on the freight moved on the upper Mississippi River in 1889 and in 1906, the board took these figures from an official Government report, and therefore did not consider it necessary to check them. It appears that there was a mistake in the figures as printed in that report.

8. *Handling and terminal charges and railway hostility to waterways and canals* (*par. 11b, G. D.*)—The first subject treated of is the terminal charge on coal. The commissions state that the board charged:

(*a*) 25 cents for transferring coal from vessel to canal barge.
(*b*) 25 cents for unloading coal from canal barges.
(*c*) 25 cents for deterioration in handling (degradation).
(*d*) 25 cents for delivery in car-load lots.

Regarding statement (*a*) the criticism is undeserved as the board made no such charge. In arriving at the other three charges, the board took the statements of people handling large quantities of coal in Duluth-Superior. These people should be in a position to give more reliable data than those in any other section of the country where the conditions are entirely different. These coal merchants buy an article in Pennsylvania which their customers demand. When it gets to Duluth it is adulterated with a substance which their customers will not accept. It must be purified and the adulterating material must be sold at about cost. Duluth dealers have gone extensively into the making of briquettes from the screenings, and in selling the manufactured briquettes—often at a lower price than the price of screened coal. They are in the section which demands screened coal. The United States engineer officer, at Pittsburgh, states (Exhibit III, par. 5, G. D.) that the run of the mine, with much slack, is now being preferred in that section "on account of its low price." Others state that the use of automatic stokers makes crushing necessary and, therefore, the slack is no loss. But the Northwest is not the section of automatic stokers and, until conditions there change the demand will continue to be for screened lump coal. Some few plants now buy and use the screenings because they are cheaper. The screenings, taken out at the head of the Lakes, costs the dealer just as much as lump coal—the condition in which it left the mine—and if he has to screen them out and sell them at a lower cost there is a loss in value. The Ohio Coal Commission (par. 39, G. D.) goes into a discussion of the fact that proper mining can reduce the amount of slack, but we must take the coal as it comes. The United States Bureau of Mines (par. 39, G. D.) goes into the number of handlings of the coal, and states that if each handling caused a loss of 25 cents there would be no value left. The bureau overestimates the handlings between the mines and Duluth-Superior by two, at the lake-loading port. Modern machinery takes the railroad car and upsets it into the vessel.

9. *Handling of coal.*—The coal is mined and screened through a ¾-inch screen. It is then dumped into the car, transported to Lake Erie, the car upset into a lake vessel, transported to Duluth, clamshelled out of the vessel, dumped on the dock, clamshelled from the pile, and dumped into the screen. It gets, therefore, from screen to screen:

One dumping into the car, one dumping into the vessel, one clamshelling out of the vessel, one dumping onto the dock, one clamshelling from the loose pile, and one dumping into the screen.

A total of four dumpings and two clamshellings.

The additional handling that it would get by the canal would be:

One dumping from the pockets into the canal barge, one clamshelling out of the canal barge, and one dumping onto the dock.

Total—Two dumpings and one clamshelling.

It therefore must get 50 per cent more handling, if it should go by canal. It would not be proper to give equal degradation effect to each one of these handlings. There appears to be little doubt that the great degradation results from clamshelling; that degradation from clamshelling in a confined space would be greater than from a loose pile; and that clamshelling near the bottom of a vessel, accompanied by shoveling, would produce the greatest degradation. This can be seen from a description of unloading coal, given by a St. Paul coal dealer operating large docks at Duluth-Superior. The description has so much bearing on the cost of unloading coal from shallow barges at St. Paul, as compared with unloading from a lake vessel, as well as on the resulting degradation, that it is given in full. He said, "Assume a vessel having 25 feet of coal in it—we can unload the first 20 feet by clamshell without much work on the part of the men in the hold. Then it becomes what we call a cleaning-up process, and labor in the hold has to keep the coal shoveled into heaps deep enough for the clam to work into. During that time we pay the laborers in the hold 60 cents per hour, as against 25 cents in the earlier operations, and the time necessary to unload a ton of coal in cleaning up is double that in the earlier process. It is also necessary in the cleaning-up operation to increase the number of laborers in the vessel." By calculation, even neglecting the increased number of laborers required, it may be shown that the cost of labor for unloading 10,000 tons of coal 5 feet deep (5 feet of coal equals 4 feet draft and 1 foot for the boat gives 5 feet draft for a 6-foot canal) will be increased 173 per cent for labor in the boat and 67 per cent for all wharf labor employed in the unloading operation above what it would be for unloading the same amount of coal standing 25 feet deep in the hold of a lake vessel. The fuel cost of operation must be increased some, on account of the increased time, and the degradation must be greatly increased where the entire cargo (instead of 20 per cent of it) must be shoveled to the clam, and the clam is always working down near to an iron deck. The board is asked to admit that the cost of unloading 10,000 tons of coal from a lake vessel, where it is 25 feet deep and occupies a space the width of two canal barges and 600 feet long (say, 40,000 square feet) and at practically a constant stage of water, will be equal to the cost of a "cleaning-up" process, covering the whole cargo over an area of the same width and 3,000 feet long (say, 200,000 square feet) on a variation of water level from 8 to 20 feet. The board is also asked to admit the degradation in coal due to 152 miles' travel in a car is equal to that caused by two dumpings and the "cleaning-up" operation by clamshell and shoveling. It is believed that both these assumptions are erroneous and should not be accepted for the reason given above.

10. *The soft-coal business.*—In this discussion the board has taken conditions existing in 1914, prior to August 1, and therefore as unaffected by war and business depression. In former times the coal was screened at the mines through a $\frac{3}{4}$-inch screen and at the head of the Lakes through the same. The consumer now insists on a $1\frac{3}{4}$-inch

or 2-inch screen at the head of the Lakes and everything that goes through it must be sold as screenings. This shows that the trade will not accept anything but lump coal, or screenings at a lower price, and that their demands in that line are not relaxing. The board in its former report took general statements of people handling coal. It has since studied the question more thoroughly and is prepared to give figures more definitely but in a somewhat different way. The best lump coal, screened at the mine through a $\frac{3}{4}$-inch screen, costs $2.25 per ton aboard a lake vessel on Lake Erie. The freight to Duluth-Superior is 30 cents, making it $2.55 aboard vessel at the dock. There is arbitrarily charged for the dock 35 cents for every ton of coal. This includes unloading to the dock, the cost of storage, clamshelling it to the screen, screening, and loading into the car; or, in other words, the total dock cost without any profit. Adding the 35 cents, the cost of every ton of coal shipped from docks is $2.90. The price of lump coal f. o. b. Duluth-Superior is (barring some temporary irregularity due to war and other business conditions) $3.55, and of screenings is $2.55. Since the price of screenings is exactly equal to the cost of coal alongside the dock, the lump coal has to pay all the dock charges, cost of selling, and profit to the dealer. The screen passes 40 per cent of the coal and generally more, but prices are figured on that basis. Taking 10 tons of coal loaded on cars at Duluth-Superior, it has cost the dealer $29 and he gets out of it—

6 tons of lump coal, at $3.55	$21.30
4 tons of screenings, at $2.55	10.20
	31.50

This leaves the dealer 25 cents per ton to cover the cost of sale (offices in Duluth, St. Paul, and Minneapolis and agents looking up business) and his profits. The actual cost of selling coal is about 15 cents per ton, leaving apparently 10 cents profit on each ton of coal handled. The board is reliably informed that the profit will scarcely average 4 cents—the other 6 cents is lost at the dock, partially due to the fact that 35 cents does not cover dock costs and partially due to breakage above 40 per cent. The actual dock cost on every ton of coal—and the dock gets only the interest on the investment, depreciation, upkeep and repairs, taxes, insurance, and the actual cost of handling the coal—is nearer 40 cents than 35 cents, as allowed by all coal dealers. One dealer states the cost to be 40 cents. The docks are the plants, and the dealers do not expect a profit from the plant—only enough to pay its expenses, including interest on the investment and to guarantee its existence—any more than a manufacturer would expect a profit on the cost of his mill.

11. *Cost of handling coal.*—In its original report the board spoke sometimes of this operating as "unloading," but meant it to cover all of the extra handling and not the simple operation of unloading. This is apparent in paragraph 56, where it is first mentioned. The commissions state there is ample room for coal docks in each of the two cities (St. Paul and Minneapolis) adjacent to the river. This is at variance with the board's statement, but it is only a matter of opinion, and would be difficult to demonstrate either one way or the other. In handling coal in the Twin Cities the board assumed that it would be taken up as a business proposition, believing

that the most satisfactory work could be done with an adequate plant. It outlined and estimated the cost of a coal yard with a capacity of 500,000 tons, based on the Mead-Morrison plant (Exhibit IX, par. 2b, G. D.); took Mead-Morrison's figures as far as they went, and then used the best it could get as to cost of land, of building the yard, and of the buildings; took what it considered proper figures for all other items of cost; allowed a reasonable figure for contingencies; and arrived at a cost between 24 and 28 cents per ton. The figures were taken to a coal dealer who had been in the business of building and operating coal docks at Duluth-Superior, Ashland, and Gladstone nearly all his life, "from the time when we unloaded by derrick operated by a horse." He said the cost per ton was too low, and the cost of yard, outfit, building, etc., was too high. It was formerly estimated that a plant could be installed at a cost of $1 per ton of its capacity, but now it requires about $1.50. The board's estimate on a 500,000-ton plant was $1,000,000. He thought it could be put up for $800,000, even with the land values pertaining to St. Paul and Minneapolis, if the land could be found. Looking over the board's estimate, he noted interest 5 per cent and depreciation 5 per cent. "That is what we allow, except we reckon interest at 6 per cent and depreciation 5 per cent—at the end of 20 years a coal-dock outfit will be nothing but scrap." He then stated that upkeep and repairs cost them 3 cents per ton on every ton of coal handled, beyond the 5 per cent allowed for depreciation; that the overhead pay roll—superintendent, foreman, weighmaster, and clerks—was a tax of 5 cents per ton; and that the loss by fire was quite a factor. The board's assumed figures for overhead pay roll and repairs were too low. Actual experience shows it to be 8 cents on every ton handled. He was then asked as to the cost of handling by smaller plant, and stated that the cost of handling was practically independent of the size of the plant. The size is determined by the volume of business. Asked as to the necessity of foremen, he stated some of their docks employed 125 men, and each operation must have a foreman. Asked as to insurance on coal, he stated that insurance was so high on soft coal as to make it almost prohibitive. On hard coal he insures to a small per cent of the full value. Another company stated that, in handling 1,000,000 tons in 1913, they had a fire (they also stated that several companies at Duluth-Superior had fires that year) which reduced 30,000 tons from a value of $3.15 (60 per cent at $3.55 and 40 per cent at $2.55) to $2 per ton. This meant a loss of $34,500 on 1,000,000 tons handled, or a tax of 3.5 cents on each ton. The above figures are given to show what it costs to handle coal and to offset those given by machinery enthusiasts, who create the impression, when they state the cost of fuel and labor at 3 cents, 4 cents, or 5 cents, that they have included the entire cost of handling coal.

12. *Cost of extra handling of coal carried by canal.*—The commissions object to the board's method of transferring the extra cost of handling to St. Paul-Minneapolis and prefer that it be figured at Duluth-Superior. This can be readily done, but it must be extended to cover the extra cost of unloading from canal barges, at the southern terminal, over that of unloading from lake vessel. The commissions have obtained from various machine-building companies the cost of a proper outfit for transferring coal from lake

vessel to canal barge and the cost of operation (Exhibits 6 to IX, G. D.). There is only one company which gives anything like full figures on costs and proposes an adequate plant for unloading lake vessels. This is the Mead-Morrison Manufacturing Co. (Exhibit IX, G. D.). In paragraph 1 (*b*) they estimate the cost of a complete plant at $1,000,000 exclusive of ground value. They estimate the machinery at $400,000. This outfit is a little more elaborate than is needed, since weighing and screening is not necessary, but that part of the plant is not very expensive and the plant without that may be considered to cost $900,000. It is designed to handle 1,000,000 tons in six months and to store 500,000 tons. Such a plant would go into the coal business at Duluth-Superior, or St. Paul and Minneapolis, in a creditable way. It would supply two coal yards (one in each of the Twin Cities) with 500,000 tons per year. It would have a storage capacity of 500,000 tons which would cover 20 acres 23 feet deep piled vertically. In pockets, coal could scarcely be piled so deep over the entire area, but it will be assumed that the plant could be put on 20 acres. Land for such a plant on the Duluth-Superior water front would not cost less than $5,000 per acre, making a total cost of $1,000,000 for the plant. It will be seen that this is a low figure. The coal dealer's general figure, of $1.50 per ton capacity, would make such a plant cost $1,500,000 for an open dock, and pocket storage would make it more expensive. If any of the storage were not made in the pockets, but on open dock, that portion would be subjected to an extra handling by clamshell and an extra dumping, increasing the cost, and increasing the degradation to 75 per cent of what it now is. On the basis, however, of a $1,000,000 plant, the cost will be figured. At 5 per cent, the interest on the investment will be $50,000; 5 per cent depreciation on a $400,000 plant would amount to $20,000; 3 per cent depreciation (allowing they will last 33 years) on storage bins, building, wharf foundations, etc., ($500,000) will amount to $15,000; the cost of fuel and labor (Mead-Morrison estimate, par. 1 (*c*), Exhibit IX, G. D.) is 3 cents per ton, or $30,000 on 1,000,000 tons; making a total of $115,000, or 11.5 cents per ton for the 1,000,000 tons handled.

This plant must be placed on a par with the large coal docks at Duluth-Superior, where experience shows that overhead pay roll on every ton of coal is 5 cents, and the cost of upkeep (exclusive of depreciation at 5 per cent) is 3 cents on every ton handled. Such a plant would have slightly less overhead pay roll than the ordinary coal dock, because of no weighing or screening, but the repairs would be heavier. It does not, therefore, appear that the coal could get away from Duluth by canal with a tax less than about 19 cents due to the extra handling. To complete the extra handling cost, there must be added the extra cost of unloading from canal barge at St. Paul-Minneapolis over unloading the same coal from lake vessel. It has been shown in paragraph 9 that the minimum extra cost of labor in the boat is 173 per cent and on the dock is 67 per cent and the fuel cost would be increased some. Considering the fact that the greater part of the labor is in shoveling the coal in the barge, it would be reasonable to assume a general increase of unloading cost (fuel and labor) of 100 per cent. Mead-Morrison estimate the fuel and labor cost of unloading a lake vessel at 3 cents per ton. Then the extra cost from canal barges would be 3 cents. This added to the 19 cents

at Duluth would amount to 22 cents. It must be noted that the above cost included no taxes, no insurance on plant, and nothing, except 1 per cent on the investment, which would not be necessary in a public terminal. Also no account is taken of unloading in a river of varying level. One per cent on $1,000,000 would mean a saving of 1 cent per ton on the 1,000,000 tons handled. It therefore appears that a corporation owning such a dock and transferring the coal, would be put to an expense of 22 cents per ton, for all the extra handling by canal, plus taxes and plus insurance on the plant; and that a public terminal would be put to an expense of 21 cents plus insurance or plus a possible loss due to lack of insurance. Such a plant, where coal is stored in bins, would be much more subject to loss if a fire occurred in the coal than would an open dock (this refers to loss of plant and not to loss of coal) and therefore the insurance rates should be higher. A most careful calculation has been made of the cost of insurance (on plant alone) and of taxes on the coal dock property in Duluth-Superior Harbor for 1913. The insurance premiums (generally on three-fourths of the value) paid by all the companies amounted to $54,783 on a total estimated value of $10,403,674. The taxes on the same amounted to $167,858. It may therefore be assumed that, on a $900,000 plant the insurance would be about $4,700; and on a $1,000,000 plant and ground value the taxes would be $16,000. These, on the basis of 1,000,000 tons, would add 2 cents to the cost if handled by private capital, making the cost 24 cents; and one-half a cent if handled by public terminal without taxes, making the cost 21.5 cents.

All these figures are based on the plant's handling its estimated capacity, or 1,000,000 tons. If it fell down to 800,000 tons (a reasonable contingency), the cost for a public terminal would run up to about 27 cents, and for a private corporation to about 30 cents. The cost of fuel for hoisting, and a part of the labor, would be saved on the unused capacity of 200,000 tons. It therefore appears that the board's estimate of 25 cents for the extra handling cost, if in error, lacked in conservatism. From the time the coal has paid the cost of handling at Duluth-Superior and the extra cost of unloading from canal barges at St. Paul-Minneapolis, over what it now costs at Duluth-Superior to unload from lake vessels, it may be compared on the basis of being alongside the dock at Duluth-Superior with dock charges and rail rate ahead of it, or alongside the dock at St. Paul-Minneapolis, with the dock charges in those cities ahead of it, with the canal rate unpaid, but extra unloading cost paid. It undoubtedly has been put to an expense of 25 cents, if not more, for the extra handling due to the use of the canal. It is presumed that it will be handled at St. Paul-Minneapolis in the same way as at Duluth—screened and weighed for shipment or delivery—and that it will necessarily cost as much as at Duluth. Therefore, since both are alongside their docks, further charges for dock service are equal. Such quality is recognized by the commissions (transportation by Canal Involves, etc., S.D.) except that they claim equal unloading cost, whether from lake vessel or canal barge.

13. Exception is taken by the commissions to the board's original estimate of 25 cents for the extra handling of coal. After quoting (paragraph 36h, G.D.) the figures of Mead-Morrison and stating that they vary from 7 to 12 cents per ton, and presumably noting that they included interest on the cost of the plant at only 4 per cent and

did not consider ground values and taxes or depreciation and interest on the cost of the wharf, the commission figures (see "Canal is Commercially Feasible, etc.—Coal," S.D.) that the full cost of the transfer of coal in Duluth-Superior will be only 5 cents per ton. The Mead-Morrison statement (Exhibit IX, paragraph 1c, G.D.) gives 3 cents per ton as the cost of fuel and labor only. The commissions allow 5 cents for the complete transfer. That leaves 2 cents to cover interest on cost of plant, interest on cost of wharf, depreciation of plant, depreciation of wharf, repairs to plant, repairs to wharf, taxes, and insurance. The board feels that such figures are unreasonable.

14. *Degradation.*—In its former report the board spoke of the "deterioration" of coal in handling. It has learned from the coal dealers that "degradation" is the proper term. In making its estimate of 25 cents per ton for degradation due to the extra handling, to which canal coal would be subjected, the board took the statements of coal dealers and did not attempt to get at the figures. It has since studied the subject and can arrive at some conclusions, although the whole matter is somewhat indefinite. It has been shown (paragraph 9 above) that, in the minimum of extra handling resulting from the use of the canal, there are half as many handlings, and half as many of each kind of handling, as in the operation of transporting the coal from mine screen to Duluth-Superior screen; it has been shown (paragraph 12 above) that any coal, not stored in pockets at Duluth-Superior, but stored in the open and transferred to the pockets, will get three-quarters as much handling by canal as it gets now from screen to screen; it has been shown (paragraph 9 above) that the degradation in unloading from shallow barge must be greater than in any handling it now gets; and it has been shown that the degradation from screen to screen in the present handling is 3 tons or more in every 10. A reduction of 3 tons out of 10 to screenings means a loss of 30 cents per ton on every ton handled. Since the extra handling by canal varies from 50 to 75 per cent of that from screen to screen, and since the unloading from canal barge will be more destructive than any handling it now gets, the board believes that its estimate of 25 cents is not unreasonable.

15. *Delivery in St. Paul-Minneapolis.*—Exception has been taken to the board's figure of 25 cents per ton for delivery in St. Paul-Minneapolis from the landing dock to local coal yards, or to carload consumers. This was taken from House Document 304, Sixty-first Congress, second session, page 23, where it is stated as a minimum of the cost in Superior. In Duluth and Superior the coal dock people also own the local yards in the same towns and are therefore in a position to figure the actual cost and the best method of handling the retail wagonload business. They state the minimum cost of delivery by car to local yards and carload consumers to be 25 cents per ton. The board can give only the rail rates in St. Paul-Minneapolis and leave incidentals out of it. The commissions figure 5 cents per ton on 50 per cent of the coal, or an average of $2\frac{1}{2}$ cents per ton. They evidently figure that the wagon delivery to all part of the two cities can be made from the landing yard in each city. This it at variance with the opinion of all coal dealers consulted, except one who thought he could do it in St. Paul by the use of motor trucks instead of teams. but he admitted that it would require a tremendous coal yard so as not to mix up rail service with truck service. Land for a coal yard

of those proportions could not, in the opinion of the board, be found adjacent to the river in either St. Paul or Minneapolis. The coal dealer admitted this. Coal in St. Paul is now delivered by horse-drawn wagons. There are a few motor trucks, but the teamsters' unions demand that they shall not be used except when the work is too great to be handled by horses. To deliver in a certain area the union price is 60 cents per ton, no matter how short the haul; outside that area it is $1.20 per ton; and each hour's delay in loading a wagon costs the coal merchant 60 cents. Due to these conditions the coal companies have local yards in various parts of the cities. Duluth, which has an area of about 60 square miles and a population of about 90,000, has eight local coal yards; Superior, which has an area of 36.5 square miles and a population of about 45,000, has two local coal yards; and these two cities have large numbers of coal docks from which retail deliveries could be made if it were practicable. In neither city is the built-up territory anything like the area given. The Duluth coal merchants claim that in their city they could not handle the local coal business from their docks. The confusion and delay would make it more expensive than to ship the coal by rail to local yards and team it therefrom to the small consumer.

Minneapolis has an area of 53 square miles and a population of 351,000. St. Paul has an area of 54.5 square miles and a population of 270,000. It is not considered necessary to give further figures to show that practically all coal coming to the river landing will be taken away by rail, either to carload consumer or local yard, or for outside shipment. There can also be little doubt of the figure of 25 cents for the minimum cost of delivery in Superior given by a man who knew the local delivery business. But the board is now prepared to give the actual rail-rate cost of such delivery over the cost of the same delivery in case the coal comes to St. Paul-Minneapolis from Duluth-Superior by rail. On coal shipments by rail from Duluth-Superior to St. Paul-Minneapolis there are no switching charges at either end. Therefore, the carload consumer, or the local coal yard, pays only the freight rate of 96 cents per ton on soft coal and $1.20 per ton on hard coal for delivery in St. Paul or Minneapolis over the cost on leaving the dock at Duluth or Superior. The delivery of coal from a river terminal in St. Paul or Minneapolis to the carload consumer, or the local yard, will entail transportation or switching charges. If the river coal yard be on the track of a certain road and the destination be on the track of the same road, the rate—from industry to industry—is 1 cent per 100 pounds, or 20 cents per ton. If the destination is on a different track, the originating line gets $1.50 per car for putting it on the track of the delivering road and the latter road gets $5 per car for delivering, making a total cost of $6.50 per car. A large coal dealer states that their shipments average 30 tons to the car. At that figure the $6.50 per car would amount to 22 cents per ton. Thus the actual rail rate in St. Paul and Minneapolis on all coal delivered to local yards or to carload consumers would be 20 cents or 22 cents per ton. This includes all coal except that shipped out of town by rail. The board selected at random three towns southwest of St. Paul-Minneapolis: New Ulm, Mankato, and Glencoe. The rates on coal are as follows:

	Soft.	Hard.
St. Paul-Minneapolis to New Ulm	$1.32	$1.65
Duluth-Superior to St. Paul-Minneapolis	.96	1.20
Sum	2.28	2.85
Duluth-Superior to New Ulm	1.80	2.05
Difference	.48	.80
St. Paul-Minneapolis to Mankato	.75	.95
Adding, $0.96 and $1.20	1.71	2.15
Duluth-Superior to Mankato	1.50	2.05
Difference	.21	.10
St. Paul-Minneapolis to Glencoe	.65	.83
Adding $0.96 and $1.20	1.61	2.03
Duluth-Superior to Glencoe	1.55	1.80
Difference	.06	.23

From this it will be seen that, under present rates, soft coal can be shipped from the Head of the Lakes to these three towns (selected without knowing anything of the rates) at an average of 25 cents per ton cheaper, and hard coal 38 cents cheaper, than it could if the coal were shipped to St. Paul and there reshipped at a local rate. By reference to Mr. Hall's figures in Appendix D (board's original report) it will be seen that as we go farther west the rates from Duluth approach those from St. Paul. To Aberdeen, S. Dak., the rate on coal from Duluth is the same as from St. Paul. Again, under certain conditions there will be switching charges in St. Paul to be added to the local rate. A railroad man states that the "distance tariff law" (paragraph 36, G. D.) does not affect these rates. Therefore, in regard to the charge of 25 cents per ton for delivery on all coal passing through the river bank yards, the following facts appear:

(*a*) The actual rail rate in St. Paul will be 20 cents to 22 cents per ton, and there will probably be some incidental charge;

(*b*) Coal going out short distances from St. Paul (to Glencoe, Mankato, and New Ulm) will be subject to an average differential of 25 cents on soft coal and 38 cents on hard coal;

(*c*) Coal going as far west as Aberdeen, S. Dak., will be subject to a differential equal to the entire rate from Duluth to St. Paul; and

(*d*) All coal moving by canal to St. Paul will leave the river bank yard by rail.

It appears that the board's acceptance of the stated figure (25 cents) for Superior was not unreasonable.

16. *Transfer to secondary yard.*—The final cost of 10 cents, which the board put on coal for delivery of a part of it from the river bank yard to another general yard, depends on the availability of space near the river for the storage necessary for St. Paul and Minneapolis at the close of the navigation season. The board expressed the opinion that such storage could not be had near the river, and the commissions say it can. If it can the charge of 10 cents made by the board (in par. 89*a* of its original report) will not be necessary.

17. *Summation.*—Summing up the criticism of the commissions at the head of paragraph 8 (above), these answers may be made:

(*a*) The board made no extra charge for transfer at Duluth-Superior.

(*b*) The board's charge of 25 cents for the cost of the extra handling is not excessive; it will undoubtedly be more; and the commission's estimate of 5 cents is entirely too small.

(*c*) The board's charge of 25 cents for the degradation is no more than a fair precaution would warrant; it must be more than 15 cents; it may be 30 cents or more; and the commissions' claim that there will be no degradation can not be justified.

(*d*) The board's charge of 25 cents for delivery in St. Paul is reasonable; the actual switching or rail rate is 20 cents or 22 cents, and it costs the coal docks at the Head of the Lakes a minimum of 25 cents; and the commissions' figure of 2.5 cents is far too low.

(*e*) The board's charge of 10 cents for transfer to another yard will depend on the availability of storage space near the river.

The board's total of 85 cents per ton is not unreasonable. If it were to reduce any of its figures it would feel that it was taking unwarranted chances. The absolute minimum that can be figured is 60 cents, and it believes that each one of the four items should be given an increase above the minimum figures. The commissions' total figure for these four items is 7.5 cents.

The board still feels justified in its original statement that Duluth and Superior are the logical and economical coal yards for St. Paul and Minneapolis. It believes that the proposed canal, as a means of transportation for coal between the Head of the Lakes and the Mississippi River, would be of no value. At the present time the larger proportion of the coal received at Duluth-Superior Harbor is transported westward and southward by rail after the close of navigation, and all of this late fall and winter traffic would be lost to the canal.

18. *Elevator charges on grain.*—In the same paragraph (11*b*, G. D.) exception is taken to the board's charges for elevator services in Duluth-Superior and in Minneapolis. The only evidence which the board can submit is that the standard elevator charges per bushel of grain in Minneapolis are stated to be three-fourths of a cent. That the same charges in Duluth-Superior are stated to be 1 cent. The board has not gone into an estimate of the actual cost to the elevators. These charges exist and figure (at Duluth-Superior) on average grain 36 cents per ton. If the board should go into figuring the cost, it does not believe that it would find the actual cost, considering labor, fuel (or power), overhead pay roll, interest on investment, insurance, depreciation, repairs, and ground rent or taxes, would be 5 cents, and that 31 cents would be clear profit.

19. *A general view.*—In the year 1912 there were received at Duluth-Superior, 8,585,039 tons of coal. The present value of the investment in coal docks at Duluth-Superior is $10,403,674. This "present value" is below the original cost, except in the case of an absolutely new dock, since the value of an equipment depreciates in 20 years from its original cost to little or nothing. Depreciation at 5 per cent and repairs at 3 per cent should be reckoned on first cost of equipment. Estimated, however, on present value (and therefore at a minimum which can never be reached), 5 per cent interest on present total value, 5 per cent depreciation, and 3 per cent repairs on present equipment value, and the insurance and taxes which were actually paid on plant and property alone (not on coal), these overheads amounted to $1,130,624, or a charge on each ton of coal of 13 cents. In 1913, owing to their handling nearly 11 millions of tons, this figure was reduced to 10.2 cents. In Duluth, where the coal

handled amounted to about 2,900,000 tons in 1912, and 3,770,000 in 1913 (but more than the coal shipped to St. Paul-Minneapolis) these charges ran up to 19.5 cents in 1912 and 15 cents in 1913. These figures do not include any operating charges. They do not include taxes on the coal, insurance on the coal, interest on the money necessary to carry a stock of coal, labor, overhead pay roll, or the cost of power and light to operate the dock. All these items must be figured in a business undertaking. The commissions figure the total cost of handling coal at Duluth-Superior, from lake vessel to canal barge, at 5 cents. An example is given (quotation from Mr. Barnes, S. D.) of an elevator in Duluth-Superior which loaded into vessels 1,250,000 bushels in one day of 10 hours, for which it received $12,500. This is a remarkable record and apparently an enormous profit. Duluth-Superior handles bulk freight rapidly. Its navigation season is short and its commerce large. In the grain business there is quite a season of inactivity in the midst of the navigation season. Grain, therefore, must be handled relatively more rapidly than coal or iron ore. The total grain and flax handled at Duluth-Superior in 1913 was 115,187,310 bushels, the greatest ever known. If the elevator mentioned were to handle the year's business, at the rate cited, it could do it in 921 hours. The 20 rail-to-lake elevators in Duluth-Superior could, if all were of the same capacity and worked at the same rate, handle the whole 115,187,310 bushels in less than two days. And yet 20 elevators must exist and pay expenses for 365 days. Probably all of these elevators are necessary to handle the crop. At the close of the navigation season of 1912 it was reported that all of them were full, and thousands of cars could not be unloaded, although the elevators had just loaded the immense fleet which took down grain on its last trip, to be held in vessel storage at Buffalo.

It is hardly fair to quote, as did the commissions before the Board of Engineers for Rivers and Harbors, the enormous elevator profit of $1,000 per hour. The following actual record shows what may happen in the elevator business, and tends to offset the selected record cited by the commissions: On May 4, 1915, the steamer *St. Clair* received 31,000 bushels of wheat; on May 5, 144,095 bushels at two different elevators; and on the 8th, 100,011 more, making in all 276,006 bushels of wheat received from the 4th to the 8th. Here we have a case where it required at least four days to load a cargo of 276,000 bushels of grain into a steamer, or at the rate of 2,875 bushels per hour. Another case: The steamer *M. A. Hanna* received 109,093 bushels of wheat on the 11th of May and 65,000 bushels on the 13th, making a total of 174,093 bushels, which required at least 48 hours to load, or at the rate of 3,627 bushels per hour. The board has little doubt that an analysis of the elevator business at Duluth-Superior would show no more than the reasonable profit its investigation has shown to result from the coal business. The board believes that the commissions have misunderstood Mr. Barnes's appeal for public terminals (quotation in S. D.). When Duluth began to take rank as a business city it found the lake-and-rail rate to St. Paul the same as to Duluth. The St. Paul merchant could receive and ship back, half way to Duluth, in competition with the Duluth merchant.

Duluth has always fought to have the lake-and-rail rate terminate at Duluth-Superior. It has never succeeded, but has obtained several increases of the differential. The last appeal (decided in 1913)

brought no increase of rate to St. Paul, but the Interstate Commerce Commission gave a reduction from eastern points to Duluth (making it the same as Chicago) and the net result was an increased differential. But the lake-and-rail rate to St. Paul absorbs the transfer and storage charges at Duluth. Thus the Duluth merchant has, at Duluth, a terminal and storage charge of (estimated by Mr. Barnes) 33 to 80 cents per ton, from which the St. Paul merchant is relieved. The Duluth merchant must reduce this or he can not compete far toward St. Paul. It is also a partially unnecessary tax on the people. The differential, at the present time, on fourth-class freight (a high average for classified freight) is $1.60 per ton. On sixth-class it is $1. When the board made its report and when Mr. Barnes made his plea, the St. Paul-Minneapolis merchant was getting his general merchandise on a basis of an average differential of $1, with no transfer charges at Duluth-Superior, while the differential in favor of the Duluth-Superior merchant was largely used up in the terminal charges at the head of the Lakes. Mr. Barnes's statements were not made to show the enormous profit of private terminals, but to show what machinery could do over manual labor in handling freight. He did not claim the present terminals were making great profits, but that they could greatly reduce the expense to the public by putting in proper machinery. This they would not do, and he asked that the Government do it. In his estimate, he was comparing machinery with hand labor, and it is not to be expected that he intended to cover all overhead charges. His appeal applied to general merchandise only.

20. *Public terminals.*—The commissions count on public terminals to make the canal a success. Every item that the board has charged in its estimate for a lake vessel to canal barge coal transfer must enter into the cost of building and operating a public terminal to do the work, except that the State's (or municipalities') credit is enough better than the individual's (or corporation's) to get money at 4 per cent, whereas the coal merchant or company may have to pay 6 per cent and certainly will have to pay 5 per cent. It may be claimed that taxes would be avoided. If so, the remainder of the public would have to make it up, for the benefit of those using the coal dock. Public terminals are satisfactory for general merchandise, where the individual's freight is received and stored by itself until removed, but it is not believed that a public coal dock could be managed unless the public go into the coal business. Terminals used as links in a business plan seldom charge excessively. Such terminals are coal docks, grain elevators, and railroad transfer docks. Their charges and costs may be unnecessarily high (as in the merchandise docks at Duluth-Superior) on account of lack of proper equipment. Such docks seldom figure more than a return on the investment, taxes, insurance, depreciation, labor, lights, and power. The profit comes from the business to which the terminal is a necessity. In such cases the institution of public terminals, without improved equipment, can not greatly reduce the cost. Farmers may subscribe to erect an elevator and then get their grain handled at the apparent cost of fuel and labor, but they are paying the difference in loss of interest on their money invested in the elevator, on its depreciation and taxes, which the farmer fails to carefully note. In cases where all the terminals are owned by a terminal company, organized to pay dividends beyond the above enumerated items of

cost, Government-owned terminals may benefit the public. The coal docks in Duluth-Superior are generally not railroad owned, nor are they owned by one company. Although coal dealers generally charge a nearly uniform price for coal, there appears to the board to be no excessive profit in it (paragraph 10 above). A portion of the elevators are owned by railroads, and the remainder are owned by several elevator companies. This arrangement provides, or should provide, competition. The general merchandise docks are said to be all railroad owned, and so are the steamers on the lakes which act in conjunction with them. It may be that in the case of general merchandise, some saving could be made by the introduction of proper machinery for handling package freight. It is doubtful if any material profit beyond the legitimate costs (with their crude way of handling freight) is made by these docks. Several railroads are concerned and that means competition, unless the railroads are actually in a combination to stifle competition. It is believed that such combinations may be controlled by existing laws.

21. *Railroad monopoly.*—The commissions claim that the railroads monopolize the lake-and-rail traffic, and it is proposed to break this monopoly by (1) the construction of this canal, (2) public terminals, and (3) independent lines of steamers. The canal will parallel the last 152 miles of this monopoly, and can affect only that part of the traffic between Duluth-Superior and St. Paul-Minneapolis, including the Minnesota Transfer. This traffic in 1912 amounted to less than 225,000 tons of flour from Minneapolis, and passing through the Minnesota Transfer, and possibly 175,000 tons of package freight, allowing that one-half of all the miscellaneous freight handled between the Twin Cities and the Head of the Lakes was freight subject to lake-and-rail rates. This makes 400,000 tons of freight handled by the railroad-owned steamers, and affected by the canal, on which it is proposed that the Government expend $420,000 per year. The commissions fail to take into account the fact that this freight is only about 12.5 per cent of the entire tonnage between the Twin Cities and Duluth-Superior. There can be no justification for the expenditure of $420,000 annually unless the idea be to break the monopoly as a matter of principle and regardless of cost, and unless there is no other way to do it. The freight and differentials on this traffic over the 152 miles amount to an average of $1.26 per ton. The Government is asked to pay $1.05 per ton, leaving 21 cents for canal rate and extra terminal costs.

[NOTE.—This discussion is made without reference to the recent decision of the Interstate Commerce Commission, which divorces the railroad-owned steamers from the railroads on the Great Lakes.]

22. *Costs of handling freight.*—There is little doubt that the present handling of bulk freight (coal, iron ore, and wheat) is done in Duluth-Superior with the best modern machinery and that there is little or no profit in it to the terminal. It is rather coincident that the terminal charge on coal, with no profit to the dock, is 35 to 40 cents and that on average grain is 36 cents per ton. With iron ore it is a question of practically a dump from car to vessel and therefore probably less expensive, although the investment is great. The commissions state (par. 12*b*, G. D.) a cost of from 3 to 10 cents per ton as a terminal charge on all freight. The board is greatly indebted to a gentleman, who declines to have his name mentioned, for much information on the subject of handling freight,

he having given deep study to equipment and costs, in planning steamship docks with rail connections at both ends of the steamship line. His problem, therefore, is car to ship and ship to car. Looking into costs he was confronted with actual figures of cost of transfer of freight, simply from car to freight shed, on no less an authority than Mr. Kruttschnitt, of the Southern Pacific Railway. They were:

	Cents per ton.
Portland, Oreg.	46.2
San Francisco, Cal.	27.2
Kansas City, Mo.	33.5
Sacramento, Cal.	33.9
Denver, Colo.	23.7
Salt Lake City, Utah	26.1
Average	31.8

He then took up the cost of the complete transfer car to ship, or the reverse, and found:

	Cents per ton.
Cost at San Francisco	50.0
Cost at Toledo, Ohio	35.0
Cost at New York and Jersey City	40.0
Cost at Superior, Wis.	35.7
Cost at Erie Railroad Docks (by hand)	38.8
Cost at Erie Railroad Docks (by motor truck)	29.1
Average	37.9

These latter costs he obtained by visiting these places and going into figures carefully, in many cases basing his results on days of timed observance of the operations and not on statements alone of interested parties. He then took up the machinery question, visited docks where certain machinery was in operation, timed the operations, and worked out his own figures of cost—labor and power only. He was at last forced to the conclusion that for short hauls on the level nothing could be found less expensive than hand labor with the regulation two-wheeled warehouse truck. This has to do the work in the car and in the ship (his ships load from side ports), and it does not pay to transfer to another conveyor for short distances, unless the grade is such as to render it difficult to handle the truck. In this conclusion he was well supported by evidence which he least expected. In the Railway Age Gazette of June 23, 1911, he had read of the remarkable plant for handling general freight put in by the Missouri, Kansas & Texas Railway at St. Louis. This plant (also described at length in the Engineering News of June 29, 1911) was conceded to be most complete. It consisted of telpher cars suspended from a monorail at the ceiling, of electric cranes, electric elevators, and automatic scales. The following quotations are taken from the article in the Railway Age Gazette:

> The cost of handling this freight by trucks has been about 45 cents a ton, and it is expected that after the plant has been in use this will be reduced to at least 30 cents.
>
> The total expenditure, including right of way, buildings, and track, is approximately $3,000,000.

In June, 1913 (about two years after its completion), he wrote for information as to the success of this plant. The following is taken from the letter he received from the general manager:

> The handling of freight in our St. Louis freight house by the telpher system has not been successful, and we are now rearranging the freight house, abandoning the telpher equipment.

Our cost has been running from 55 to 60 cents per ton with the telpherage system, and we can handle it by hand for 34 cents to 35 cents per ton.

After giving the subject most careful study he planned his dock to unload the cars and move the freight to the ship's side by hand truck; from there is was to be taken to the ship on a moving platform, the outer end being lowered or raised to meet various water stages. Desiring to avoid the employment of the labor, he undertook to make a contract for handling freight. The contract price simply covers labor, power, and repair of machinery. In order to understand this contract it is necessary to note that two classes of labor must handle the freight. Dock labor takes it from the car and places it at the ship's side. Stevedore labor takes it from the ship's side and puts it in the ship. Dock labor will not deliver it or receive it beyond the designated line, and stevedore labor will not receive or deliver it beyond the same line. When the ship is not loading, a certain amount of freight can be put in the "ship's side" area. If it has to be piled above a certain height an extra price is paid. Whatever can not be piled at the ship's side has to be taken to storage in the warehouse. This costs the same as car to ship's side. When this is again moved from warehouse to ship's side, the cost is the same as car to ship's side. Based upon these conditions the following was the best contract he could make:

Car to ship's side or ship's side to car (cents per ton).

Article.	Straight.	Excess height.		Extra if stored.	Total.	
		Feet.	Cost.		Minimum.	Maximum.
Flour	12.5	15	17.5	12.5 or 17.5	12.5	35
Grain	15	8	20	15 or 20	15	40
Bran, shorts, etc	15	8	20	15 or 20	15	40
Hay and straw, etc	17.5	6	22.5	17.5 or 22.5	17.5	45
Cased provisions	20	8	25	20 or 25	20	50
Barrels and kegs	15	(1)	20	15 or 20	15	40
Paper in rolls	20	(1)	25	20 or 25	20	50
General merchandise (limit 1 ton and 40 cubic feet)	20	8	25	20 or 25	20	50
General merchandise (limit 1 ton and 80 cubic feet)	25	8	30	25 or 30	25	60
General merchandise (limit 1 ton over 80 cubic feet)	30	8	35	30 or 35	30	70
Machinery	25	.....	.....	.....	25	25
Sugar, coffee, rice	12.5	8	17.5	12.5 or 17.5	12.5	35
Fruits and vegetables (into ordinary cars)	22.5	8	27.5	22.5 or 27.5	22.5	55
Fruits and vegetables (refrigerator cars)	30	8	35	30 or 35	30	70

[1] In tiers on flat.

Loading or discharging ship (cents per ton).

Article.	In.	Out.	Remarks.
General merchandise (limit 1 ton and 40 cubic feet)	30	25	
General merchandise (limit 1 ton and 80 cubic feet)	35	30	
General merchandise (limit 1 ton over 80 cubic feet)	45	40	
Sugar, coffee, rice	.....	25	
Cased provisions	.....	30	
Vegetables (crated or sacked)	.....	35	
Oils (barrels or cases)	.....	30	
Cement and fertilizers	35	32.5	
Flour and grain	25	.....	
Hay, straw, ground feeds	20	.....	
Paper in rolls	32.5	.....	
Lumber, lath, shingles	$1	.....	Per 1,000 feet b. m.

The contract provided for the company's furnishing all machinery and equipment, except stevedore's gear for handling to and from ship; that the contractor should repair such equipment, but that the company should renew it. It also provided that the company should pay all extra cost of labor due to overtime, and that, in case the rate of dock labor should be increased, the rate per ton should be increased in proportion. The above contract prices therefore do not include any interest on investment, depreciation, taxes, or insurance. It is appreciated that it probably includes a profit, but when it is noted that the very cheapest transportation from car to ship (flour) is 37.5 cents per ton, and that it may run as high as $1.15 (general merchandise over 80 cubic feet, unloaded, stored, above 8 feet, and loaded) it can scarcely be claimed that terminal charges (lake-to-rail or canal barge-to-rail) should be figured at 3 to 10 cents. The gentleman's attention was called to this statement made under "flour" (second heading, S. D.) regarding public terminals in San Francisco: "San Francisco is correcting it by installing modern unloading and handling apparatus, which will economically handle general freight from and to a steamer. We understand they have fixed a charge there, which covers their operating expense, at 5 cents per ton." His reply was: "The docks in San Francisco are owned by the State. I have visited every modern steamboat dock in San Francisco at least ten times in the past year, looking for a dock location for ships. There is not a public-owned equipment in San Francisco for handling general freight. The public terminals do not undertake the handling of freight, they simply rent out the dock space at a figure per square foot which will pay interest on the investment, depreciation, and repairs. We have rented 100,000 square feet at 9 mills per square foot per month or for $10,800 per year. We expect to handle 75,000 tons of freight and therefore our rent will be a tax of 14.4 cents per ton on each ton handled and that does not pay a cent toward the cost of handling the freight, which we feel assured will not be less than 50 cents per ton and are afraid it will prove to be nearer $1."

It therefore does not appear that the board's charges are excessive. A comparison after further investigation shows:

Article.	Board's charge.	Proper charge.	Source of information.
	Cents.	*Cents.*	
Coal	25	35 to 40	Careful study of coal business.
		30	Independent estimate.
Grain (bulk)	36	36	Actual elevator charges.
Grain (in sacks)	.....	40	Above contract (minimum).
Iron and steel	25	45	Do.
Flour	33	37.5	Do.
General merchandise	25	45	Do.

It should be noted that the contract prices are for handling freight by the most economical equipment that could be devised by a practical man, after months of study, and that they include nothing but labor, power, and repair of machinery. The commissions state that all terminal charges should be from 3 cents to 10 cents. It must be concluded that the board's figures were too low and that the commissions' are more so.

23. *Average rail rate (paragraph 11f, G. D.).*—The board made a mistake in its original report in designating all freight, except coal, iron, flour, and grain, as "General merchandise." It should have been called "Miscellaneous freight." It therefore includes many cheap commodities as well as general merchandise. The mistake is apparent, since the total freight is found by adding this item to the other four, and since the board, in getting at this item's average rate by rail, used the rates on stone, cement, lime, salt, and sugar. Regarding the board's determination of this rate, the commissions state: "This method is obviously improper and the result inaccurate." It is admitted that the method was more or less crude, but the board did not feel justified in asking, as suggested by the commissions, any one to give the tonnage of each article on the list. Since the freight involved in this item is only 10 per cent of the total tonnage, a mistake of 10 cents in its rate would affect the general average to the extent of only 1 cent. Sugar at $1.60 is the principal item cited in criticism of the board's methods. As a matter of fact the all-rail rate on sugar from New York to St. Paul and Minneapolis is 30.5 cents per hundredweight. The rail-lake-and-rail rate is 30 cents, and the rail-and-lake rate to Duluth is 25 cents over some roads and 30 cents over others. A St. Paul merchant, handling large quantities of sugar, states that scarcely any sugar comes to St. Paul via the Lakes, since the saving of one-half cent per hundred is not worth the delay. This is the exact amount (10 cents per ton) and the "present business methods" referred to by the board in paragraph 53 of its report. No wholesale merchant in St. Paul-Minneapolis would actually buy his sugar in Duluth-Superior and pay the local rate of $1.60. It therefore appears that sugar at $1.60 is not one of the largest items in the list; that instead of getting sugar from Duluth at a rate of $1.60, the St. Paul-Minneapolis merchant receives very little via Duluth-Superior; what he does receive costs him a differential of only $1 per ton; and, in preference, he gets it by rail from New York at a cost of $1.10 per ton over the cost to the Duluth-Superior merchant. At the time the board made its report the average differential on classified freight between Duluth-Superior and St. Paul-Minneapolis was $1 per ton. Eliminating coal, iron, flour, and grain from the table in paragraph 49 (board's report), there remain:

Lumber	$1.20	Sand	$1.00
Building stone	1.00	Stone	1.00
Cement	1.00	Stone, crushed	.90
Lime	1.20	Sugar	1.60
Salt	1.00		

If sugar be changed to $1 (the actual differential) and classified freight be put in at $1, or its average differential at that time (and very little classified freight originates in Duluth-Superior or goes there from St. Paul-Minneapolis—in other words, pays a local freight rate), it will be seen that $1.16 was high and that, although the board's method may have been improper, its results were not very inaccurate. Under present conditions, with the average differential on classified freight raised to $1.60 (see paragraph 19 above), the average rate on miscellaneous freight might go a few cents above $1.16. However, the whole item is only 10 per cent of all the freight handled.

24. *Points as to which local board is in error (paragraph 12, G. D.).*—(*a*) The board neither found nor assumed a reason for the decadence in inland waterway transportation. It simply treated it as a fact, and the board's acceptance of that fact should not be taken as a hostile act toward all inland waterway improvement, nor does the board believe the decadence is due, in all cases, to unrestrained, cut-throat competition or to boycotting of such traffic by the railroads. It is the board's belief that, in cases where it is cheaper to transport by water, the decadence is largely due to public apathy, and in cases where it is not cheaper the decadence is natural.

(*b*) The terminal charges on coal (paragraphs 12 and 13 above) and on wheat (paragraph 18 above) and the degradation of coal in handling (paragraph 14 above) have already been covered. The board does not admit that terminal charges on freight can be reduced to 3 to 10 cents per ton (paragraph 22 above). It believes that about all that modern machinery can do is now being done on the Duluth-Superior coal docks, and that the cost of handling coal, even if the docks were public terminals, would be at least 30 cents for the entire service. It believes that similar figures could be found to apply to the elevators. On general merchandise the costs at Duluth-Superior might be somewhat reduced. Duluth-Superior would profit more than St. Paul-Minneapolis from such a reduction.

(*c*) The average rail rate has already been discussed (paragraph 23 above). The board did not assume that existing rates will remain as low as at present. The board did not, on any point, go into speculation for the future. It simply accepted present facts. Rail rates may increase. The railroads say they must increase to pay operating expenses—not to make increased dividends. Railroad expenses are, when the final analysis is made, dependent on the cost of material and labor. Exactly the same causes must increase canal rates. The board accepted existing rail rates and existing canal rates. The board also accepted the fact that the railroads are carrying the freight. If the time comes when they can not carry it, and the people must have the freight, the canal should be built regardless of cost. It will not then be a question of commercial feasibility; it will be one of commercial necessity. But under present conditions its feasibility is the question.

(*d*) The board took what it considered reliable information on the total traffic in 1912, without putting any one to the trouble of giving it exact figures. Its figures appear to be too low, if those submitted by the commissions are correct. The effect of this would be to reduce the cost per ton to the public for the Government's expenditure under each case (paragraphs 45a and 90, board's original report). Since the cost to the public does not enter into the board's general summation (paragraph 89, board's original report), its conclusions can not be changed whether actual commerce in 1912 (plus estimated local traffic along proposed canal) would have been three and one-third or four millions of tons. The board did not figure that the commerce would increase 15 per cent each and every year from now to 1920; the board had no right to assume such an increase. The question before the board was: Is the canal now commercially feasible? and not: Will it be feasible or necessary in 1920? Great increase in rail rates may make it feasible some time, and increased traffic may make it necessary.

(*e*) The Erie Canal rate will be taken up in another paragraph.

(*f*) (*g*) and (*h*). If these are errors on the board's part, they are errors of judgment and not of fact. Whether they are errors at all must be left to the readers of the board's statements.

25. *Flour.*—The commissions mention flour next to general merchandise as the most productive of reduction in cost to the public by the introduction of handling machinery and public terminals. They state (Flour, S. D.), "All flour shipped by rail to Duluth is charged 16 cents per ton for transfer from car to lake vessel." Also under "Flour" (second heading, S. D.) they state, "The railroad and warehouse commission of Minnesota, on June 27, 1914, state such rate to be $0.058 per hundred, or $1.16 per ton." Again (paragraph 44, G. D.) they state that the board charged 35 cents to flour for transfer from mill to river in Minneapolis. The last statement is incorrect, and the other two differ from those of railroad officers and Minneapolis shippers of flour. A general freight agent writes: "The cost of getting a ton of flour Minneapolis to Buffalo is only $1 per ton more than the cost of getting a ton of flour Duluth to Buffalo." An assistant traffic manager writes: "The rates from Minneapolis to Buffalo include the handling from cars to boat, storage, and other incidental expenses." It therefore appears, as allowed by the board, that $1 per ton from Minneapolis to Duluth-Superior absorbs all transfer and storage charges incidental to loading on to the lake vessel. While proper machinery could reduce the cost somewhat to the railroads, the public is getting flour handled at a better than average rate. Comparing flour with other articles granted commodity rates, from f. o. b. Minneapolis-St. Paul to f. o. b. lake vessel or the reverse, we find the following costs per ton:

Wheat, $1.33 (33 bushels to the ton).
Coarse grain, $1.47 (average 47 bushels to ton, 1913).
Flour, $1 (without storage or transfer charges).
Hard coal, $1.20 (plus cost of transfer vessel to car).
Soft coal, $0.96 (plus cost of transfer vessel to car).

It does not therefore appear that any material reduction could be expected on the present flour rate.

26. *The Erie Canal rate.*—The board's authority for the Erie Canal rate is stated—the Interstate Commerce Commission. The commissions give (paragraph 23, G. D.) two authorities on average canal rates in the State of New York. Neither is a statement for the Erie Canal alone. The commissions have used an average rate for 10 years. This is no more justifiable than it would be to average the freight rates from Duluth-Superior for the past 10 years—the rate on soft coal is stated to have been as low as 75 cents per ton. (H. Doc. No. 304, 61st Cong., 2d sess., p. 23.) The board's stated rate (3 mills per ton-mile) was for 1902—before the enlargement of any part of the Erie Canal; the commissions' statement (from governmental source for all canals in New York State) for 1902 shows 2½ mills: the average for that year and the succeeding three years was 2.475 mills; the last year given was 2.6 mills; but the commissions, by their method, get 2.14 mills per ton-mile. They state that the Erie Canal has deteriorated until it can carry only 4½ feet. This shows that the comparison which the board made was quite accurate. Deterioration has put the Erie Canal (formerly 7 feet) on a parity with the proposed canal—each can safely and economically carry

about 4½ feet. The board still feels that the Erie Canal rate of 3 mills per ton-mile is a proper charge. Yet the commissions, in making their summation (summary of saving, etc., S. D.), figure as low as 1½ mills and with the addition of terminal charges entirely too low find the canal would have saved the public nearly $2,500,000 in 1912 and will save $5,000,000 in 1920. How is the rate of 1½ mills per ton-mile obtained? By a 17 per cent reduction of the actual cost of handling coal on the Monongahela River—an 8-foot project, open river except four locks, entirely down-river haul, with locks which will take 3,000 tons of coal; "three boats, 8-foot draft, with towboat, able to pass through the locks unbroken." (Asst. Engineer Roberts, Exhibit 3, paragraph 2, G. D.) The passage of this 3,000 tons of coal through the four locks might take two hours. To pass the same amount of coal through the locks and lifts of the proposed canal would require 60 hours (2½ days) besides much slower progress through the canal between the locks. Again, delays are minimized on the Monongahela because they have double locks, so that two tows can be locked through at the same time. The actual cost quoted (1.8 mills), used in justification of a 2-mill rate on the proposed canal and then reduced one-quarter, was by a firm shipping 2,000,000 tons from its own mines by its own boats to its own plant and therefore entirely independent of anything (except at the locks, and they are double) which could delay them in the least. Everything could be arranged to produce the material, transport it, and unload it exactly as they wish.

This record of 1.8 mills per ton-mile was the actual cost (no profit), and on coal. The commissions have reduced this cost to 1½ mills for coal on the canal and call it a rate—thus making a rate cheaper than the actual cost on a great river under the most ideal conditions. It is also stated in the same document (Exhibit 3, paragraph 3, G. D.) that some shippers estimated their cost at "double the Jones & Laughlin figures." Doubling the actual cost would be 1.6 mills and adding 1 mill depreciation would give 2.6 mills. In Exhibit 4, paragraph 2, Mr. Roberts says that it is a question of "area" rather than depth. The proposed canal will have neither area nor depth and therefore its cost of transportation should not be compared with either the Monongahela River or the Great Lakes. Any single assemblage of a great cargo propelled by one power, whether it be in broad area of shallow depth, as on open river with large locks, or narrow area of deep draft, as on the Great Lakes, can carry freight cheaply; but when the cargo is contracted in both directions, such cheap rates can not result. Mr. Roberts's final paragraph (Exhibit 4, G. D.) points out a canal which is estimated to carry coal at 20.1 cents or 1.44 mills per ton-mile, but when toll (30 cents) and other sources of profit are added (amounting in all to 40.1 cents) it becomes 4.3 mills. It should not be assumed that this 200 per cent is clear profit after counting interest, maintenance, and operation. The 30-cent toll probably covers all these items. Adding 30 cents, the cost becomes 3.6 mills, and this canal carries boats of four times the capacity and more than twice the draft of those on the proposed canal. This canal is even spoken of as a "ship canal." The Erie Canal rate on wheat (and wheat is a commodity commanding a better than average rate) from Buffalo to New York city, is 4.5 cents per bushell or $1.50 per ton. The dis-

tance is practically 500 miles but the last 150 miles is open river where the boats may be made up in fleets handled by a single towboat—a cheaper method of transportaion. Taking the distance as a canal haul all the way, the rate figures 3 mills per ton-mile. All investigations made by the board, and even the figures produced by the commissions, tend to convince the board that its rate of 3 mills per ton-mile is not too large for the proposed canal. Since the length of the route is 260 miles, and the proper rate to apply is 3 mills per ton-mile, the average canal rate from Duluth-Superior to Minneapolis must be taken as 78 cents. If the rate for coal is cut down, the rate for higher classes of freight must increase more in proportion, since coal is the greater part of the freight and 3 mills is an average rate.

27. *Past obstacles not necessarily applicable to future projects (paragraph 34, G. D.).*—The board has under consideration a present project and has considered present obstacles. Under various headings (*a* to *g*) are discussed matters not before the board, as to national policy and remedial legislation. One paragraph of the comments leads the board to conclude that the author did not carefully read the board's report. The board did not assume an extra handling charge of 25 cents on coal at each end of the canal, and did not put a charge of 35 cents on flour from the mill to boat. The board assumed that flour could be loaded from mill to boat as cheaply as it is now loaded on cars. In this the board erred in favor of the canal. The mills are not convenient for river transportation and there will be no "barge close at hand." The board was influenced in making this concession to the canal by a statement of some Minneapolis people that they were planning a belt or an endless chain conveyor to take flour to their river terminal at low cost. It can not be transported and loaded on barges as cheaply as it is loaded on cars and the board should not have assumed that it could. But having made the assumption the board should not be charged with having put on 35 cents per ton for this service.

28. *Traffic Finding F (paragraph 47, G. D.).*—There are some general statements in this paragraph to which attention is invited. Based on two premises—the Government's expenditures on the Mississippi River and the fact that 80 per cent of the commerce of the Great Lakes passes through the Soo Canal—the commissions conclude that "the logical destination of a Lakes-to-the-Gulf through waterway is a link joining the Mississippi River with Lake Superior." As a matter of fact an analysis of the premises leads to an entirely different conclusion. The commerce through the Soo Canals for the year 1913 was 79,718,344 tons. Of this 72,844,560 tons were made up of iron ore, coal, and wheat (roughly 48,000,000, 18,500,000, and 6,000,000, respectively). Iron ore should be left out of any material consideration for the canal, since it is used at Duluth, at points on the lower Lakes, or at points reached from the lower Lakes. If conditions should ever change so that a demand for iron ore should arise in St. Paul-Minneapolis, or lower down on the Mississippi River, the rapidly developing mines around Brainerd would furnish it. Brainerd is 129 miles from Minneapolis and ore could be put at the smelter's door with no charge except freight. The nearest mines to Duluth are about 75 miles. Ore to St. Paul-Minneapolis via the canal would require 75 miles

by rail and 260 by canal and river, would have to be transshipped at Duluth-Superior, and would have a terminal charge at St. Paul-Minneapolis. Ore for down-river use would have equal terminal charges; one source (Brainerd) would be 129 miles by rail and 40 by river, to Prescott; and the other would have 75 by rail and 220 by canal. In considering coal, only that part destined for St. Paul-Minneapolis and tributary country can be affected. At the present time the price of coal in St. Paul is largely dependent on the cost of getting Illinois coal with an all-rail freight rate of $1.40 per ton. Improvement of the Mississippi River, if followed by resumption of navigation, should put Illinois coal into St. Paul-Minneapolis at a less rate and should diminish, rather than increase, the consumption of eastern coal. At least no great territory southward along the Mississippi should be expected to be supplied via Duluth-Superior as a result of the conditions cited. Wheat, considering the great movement, goes to Duluth-Superior by rail direct from the farm, and not through St. Paul-Minneapolis. The large shipment of coarse grains does not go by Lake Superior—only the small amount raised in the wheat country and a small portion drawn from the northern part of their principal area of production.

The commissions cite the price of coarse grains in New York as compared with the prices in Chicago as a reason for the canal. In the eastern States the production and consumption of coarse grains are more evenly balanced than in the case of wheat. Wheat is raised mostly north of St. Paul-Minneapolis. Duluth-Superior and the Great Lakes are its natural outlet to its great market—the eastern United States and Europe. Coarse grains are raised south of St. Paul-Minneapolis, and their market is in the Middle West and the South, where large quantities are consumed and little raised. Their natural trend is, therefore, toward Chicago and St. Louis. The price is higher in New York than in Chicago, but the great demand is not in New York, and Lake Superior is out of the natural line from the great producing area to the market. The country immediately surrounding Lake Superior produces little of anything which would find a market in the South. Neither is it a region of great consumption. Aside from Duluth-Superior, the iron range, the Ashland country, and the copper country, there is little population. What it does consume it either produces itself or gets from the East by the Lakes at a much cheaper rate than can be had by the Mississippi River. It is not believed that the tonnage that may develop "between Lake and Gulf, between the Mississippi Valley and the Pacific via the Panama Canal" will touch Lake Superior. The proposed canal is not "through the center of the United States," but far toward its northern border. Lake Superior territory is not a large producer, except in iron ore, copper, and wheat—its lumber business having nearly departed. It is not a large importer except in the coal and general merchandise consumed in its natural territory. Its natural territory, on account of the Mississippi River, is limited toward the south. Its large territory to the west (the Dakotas and Montana) is naturally reached without going south 150 miles to St. Paul-Minneapolis. The wheat that finds outlet to the "Pacific via the Panama Canal," to the South for domestic consumption, or to New Orleans for export to Europe (if such trade develops) will not go

to Duluth and use the canal. Duluth is not in the wheat territory, but far east of it. Any wheat attracted away from its present route and to the Mississippi River will not go to Lake Superior, except it be to reach Chicago via the Lakes, should Chicago become the head of 8-foot navigation on the Mississippi River system. The threatened revival of navigation on the Mississippi River, to include export wheat and flour, will undoubtedly divert commerce which now parallels the proposed canal. Lake Superior has a wonderful commerce, because it is the natural water route from the great iron mines to the great furnaces, because the Great Lakes make a cheap outlet for the wheat crop in its natural direction to market, and because they furnish a cheap route for coal from its great production center to the Northwest. But Lake Superior neither receives nor produces anything that would naturally go in large quantities far south of Prescott, Wis.—the junction of the proposed canal with the Mississippi River; neither would Lake Superior draw to any extent anything from the territory south of that point. Its coal, even as far south as St. Paul-Minneapolis, is largely cut into by Illinois coal, and resumption of navigation on the Mississippi River should increase the use of Illinois coal.

29. *Recapitulation and comment.*—(*a*) In paragraph 11*b* (G. D.) the commissions claim that the board charged coal with a 25-cent terminal cost at each end of the canal. The board charged 25 cents for the entire extra handling of the coal shipped by the canal and not 25 cents at each end. Terminal charges on coal and wheat have been investigated again by the board and its original figures still appear warranted; also the degradation charge to coal due to extra handling and the cost of delivery in St. Paul-Minneapolis. (Paragraphs 8 to 20 above.)

(*b*) In total tonnage for the fiscal year 1912 (paragraph 11*c*, G. D.) the commissions' figures show somewhat more than those of the board (about 26 per cent more). The commissions' figures for 1920 may or may not materialize. (Paragraph 24*d* above.)

(*c*) The average rail rate (paragraph 11*f*, G. D.) has been found to have been large, rather than small, under the conditions existing at the time the board wrote its report. Under present conditions, with the soft-coal rate raised 6 cents and the average general merchandise differential raised from $1 to $1.60, the average rail rate would figure about 3 cents higher than the board's estimate of $1.024. (Paragraph 23 above.)

(*d*) The additional tonnage outlined in paragraph 21 (G. D.) has been partially discussed and is still believed not to be available. (Paragraph 28 above.) Many claims made in paragraphs 21 and 22 (G. D.) do not appear to require an answer.

(*e*) The Erie Canal rate used by the board (3 mills per ton-mile) appears warranted and its application to the proposed canal seems justified. (Paragraph 26 above.)

(*f*) Public ownership of terminals (paragraph 36, G. D.) has been covered and there appears to be no great benefit applicable to the proposed canal. (Paragraph 20 above.)

(*g*) Regarding the United States Steel Corporation (paragraph 42, G. D.) comment was made in original report, but it is pertinent to state that cement is delivered from Mason City, Iowa, to the car-

load consumer or retail dealer in St. Paul-Minneapolis at $1.20 per ton, and the rail rate from Duluth is only $1 per ton delivered on any siding.

(*h*) The great saving of terminal charges outlined in paragraph 43 (G. D.) has been covered and believed to be overestimated and helped out by a canal rate below what is justified.

(*i*) In the handling of flour (paragraph 44, G. D.) it is stated that the board charged 35 cents for loading on barges at Minneapolis over the present cost of loading on cars. This statement is erroneous. Under "Flour" (second heading, S. D.) the commissions give the rate to Duluth as $0.058 per hundred. The rate on through flour for the east (the great bulk of flour) is 5 cents per hundred f. o. b. Minneapolis to f. o. b. lake vessel. Under the first heading, "Flour," it is stated that all flour is charged 16 cents for transfer at Duluth. Nothing is charged for transfer or storage at Duluth. (Paragraph 25 above.)

(*j*) In paragraph 46 (G. D.) many more claims are made for freight for the canal, of which little will materialize.

(*k*) Matters discussed in paragraph 47 (G. D.) have been covered by the board and found to be claims which do not apply to the proposed canal. (Paragraph 28 above.)

(*l*) Under "Canal rate" (S. D.) this statement is made:

> It only costs 5 cents per ton to take coal from lake vessel, put it on dock, screen it, and load it into cars.

As a matter of fact (about which there can be no doubt) the actual cost including storage is at the very least 35 cents and probably nearer 40 cents. All the estimates of the commissions for terminal charges should be similarly increased. The board's estimates are believed to be conservative.

(*m*) Under "Transportation by canal involves, etc." (S. D.), it is stated that the board charged grain transfer at Duluth-Superior to the canal-hauled grain and did not charge it to rail-hauled grain. There is also found the statement:

> This is absolutely inaccurate and is not and can not be justified from any standpoint or by any authority.

The board has been informed that the commissions expressed a desire to withdraw this statement, having found that the board made no such discrimination. No communication having been received upon the subject, the board has decided to submit its report with this reference to the matter.

(*n*) Under "Conclusion" (G. D.) the commissions offer cooperation to the extent of providing public terminals. It has been shown that in the handling of iron ore, wheat, and coal no great saving could be made over the present handling. To quote from "Flour" (second heading, S. D.):

> Mr. Barnes shows rather conclusively that, with the exception of coal, iron ore, and grain, the lake transportation upon which the Government has expended more than $100,000,000 is of no particular benefit to the public by way of reduced freight rates.

Of the seventy-nine and three-quarters millions of tons of freight passing through the Soo Canals in 1913, "coal, iron ore, and grain" made up seventy-five and one-third millions. Therefore, as shown by

the board, and as may be implied from Mr. Barnes's statement, the advantages from public terminals would apply, to any material extent, to only 5.5 per cent of the freight passing the Soo Canals, and even on that amount the construction of the proposed canal should not be the only way to remove the difficulty.

(*o*) Regarding cooperation, the board feels that the proposed canal is so local in its nature that cooperation in its construction, far beyond the furnishing of public terminals, should be offered before the United States should consider undertaking the work.

30. *Position of the commissions.*—The commissions apply open-river conditions to a narrow and shallow canal; and even claim that a canal rate can be had equal to or less than the actual cost on an open river. They couple with this terminal charges which include only a few items of the expense of such terminals, and thus arrive at a great saving to the public from the construction of the canal. Claiming these low terminal rates can be had, they assume that the present terminal rates are excessive and that public terminals will result in great saving to the public. In these claims they are believed to be wrong as to all items entering largely into lake commerce—ore, coal, grain, and flour. This practically reduces the argument to the general merchandise, to which the lake-and-rail rate applies. On this there is an average differential of $1.60 per ton. They claim this differential is too great for a distance of 152 miles. It does appear great—1.05 cents per ton-mile—but it must not be overlooked that it includes a transshipment. Transshipment must be made whether the freight goes on to St. Paul-Minneapolis by rail or by canal, and transshipment of general merchandise is more expensive than that of the articles which make up the bulk of the lake freight. If the cost of transshipment be added to the canal rate, and the sum be subtracted from $1.60, there will be little left to justify the canal for handling general merchandise. There is little or nothing to justify it from the standpoint of coal, ore, grain, or flour.

31. *Conclusion.*—In view of the above the board still adheres to its original recommendation that the proposed canal connecting Lake Superior and the Mississippi River by way of the St. Croix River is not now feasible and practicable considering the necessary location, plans, cost of construction, commerce affected, and water supply.

CHAS. L. POTTER,
Lieutenant Colonel, Corps of Engineers.
E. D. PEEK,
Major, Corps of Engineers.

JOINT RESOLUTION MEMORIALIZING CONGRESS IN FAVOR OF A CANAL CONNECTING LAKE SUPERIOR WITH THE MISSISSIPPI RIVER VIA THE BRULE AND ST. CROIX RIVERS, AND PROVIDING FOR THE APPOINTMENT OF A COMMISSION TO PROMOTE THE CONSTRUCTION THEREOF AND TO ACT IN CONJUNCTION WITH COMMISSIONS APPOINTED BY OTHER STATES.

Whereas the Congress of the United States, by two several and separate acts passed in the years 1894 and 1899, authorized and directed two separate surveys and examinations of three proposed routes for a canal connecting Lake Superior with the Mississippi River, one of said routes being from Lake Superior to the Mississippi River via the St. Louis River, one via the Rum River and one via the Brule and St. Croix Rivers; and

Whereas, after an actual examination and survey of said several proposed routes, the United States Government engineers did report in the year 1894 that the most feasible route for said canal is the route from Allouez Bay, on Lake Superior, via the Brule and St. Croix Rivers to the Mississippi River, and recommended said route; and

Whereas in the year 1899 the United States Government engineers did again report that a canal from Lake Superior to the Mississippi River via the Brule and St. Croix Rivers was entirely feasible; that in the first of said reports of said Government engineers it was estimated that said canal could be constructed 7 feet deep, 80 feet in width at the water surface, and 59 feet in width at the bottom thereof for the sum of $7,050,000; and in the second of said reports it was estimated that said canal could be built 80 feet in width at the water line, 59 feet in width at the bottom, and 5 feet deep for the sum of $6,012,500; and

Whereas the project of constructing said canal has not been authorized by Congress because of reports of said engineers to the effect that the construction of said canal was not warranted, owing to existing railroad competition and the cost of said canal as compared with the benefits to be derived from the construction thereof; and

Whereas it conclusively appears from the surveys and examination of the route made by the Government engineers that it is entirely feasible and practicable to construct and operate said canal along the route specified from Allouez Bay, on Lake Superior, via the Brule and St. Croix Rivers to the Mississippi at the junction of the St. Croix and Mississippi Rivers, and the only objections which apparently prevent Congress from authorizing said project are the existence of railway competition and the doubt expressed by said engineers as to the amount of commerce which would be carried upon said canal; and

Whereas no survey or examination appears to have been made or authorized by the United States Government of said route to ascertain whether the same could be constructed and operated at a depth of 10 feet, nor as to whether a canalization of the Mississippi River by the construction of a dam below the junction of the St. Croix and Mississippi Rivers would be practical, which would in fact extend said waterway so as to connect the cities of Minneapolis and St. Paul with the cities of Duluth, Minn., and Superior, Wis., by means of said canal and the canalization of said Mississippi River; and

Whereas millions of consumers and producers of the Northwest and the Mississippi Valley are vitally interested in the construction of said canal and the improvement of said Mississippi River so as to form a complete and continuous inland waterway from the Mississippi Valley and the twin cities to the Atlantic seaport via the Great Lakes, thus enabling all of the products of the Eastern States and the States bordering on the Great Lakes to be shipped by water to all points in the Northwest and the Mississippi Valley and the agricultural and other products of the Northwest to be shipped by water to the market of the world; and

Whereas at all of the hearings held upon the question of the commercial necessity of said canal and waterway a great mass of producers and consumers interested have had no adequate opportunity to be effectively heard, and there is no lawfully constituted authority, official, or commission of this State authorized or empowered to ascertain and present the facts or collect data and statistics relating to commerce bearing upon this important subject; and

Whereas the State of Wisconsin and the people of said State are also greatly interested in the construction of said canal and waterway: Now, therefore, be it

Resolved by the House of Representatives of the State of Minnesota (the Senate concurring), That the construction of said canal by the National Government is of the greatest importance to this State, the State of Wisconsin, the Mississippi Valley, and the Nation; that its construction will be a great addition to existing facilities of commerce; that it would constitute a natural, adequate, and automatic means of reducing transportation rates on all commodities between the Mississippi Valley, the great Northwest, the Great Lakes, and the Atlantic seaports, and that it would tend to reduce rates upon coal, iron, steel, manufactured articles, grain and other agricultural products, and would greatly benefit the consumers and producers of the East and the West and reduce the cost of the necessities of life.

Resolved further, That the governor of this State, the drainage engineer of this State, the chairman of the board of railroad and warehouse commissioners be, and they are hereby, appointed a commission, of which the governor shall be chairman, which shall be known as the Lake Superior and Mississippi River Canal Commission, and said commission is hereby granted power and authority and is hereby directed to investigate and ascertain all of the facts with reference to the practicability and cost of construction and operation of said canal, utility thereof, and the character and amount of commerce which would probably be carried or affected by said canal, and the probable effect of the construction and operation thereof upon transportation rates and upon the consumers and producers of the Northwest, and especially the States of Minnesota and Wisconsin, provided, however, that the expenses of such commission in carrying out the provisions hereof shall not exceed the sum of $2,500. Said commission is hereby directed to lay before the United States engineers, and any other Federal commission, board, or authority having jurisdiction of any question relating to the construction of said canal by the United States Government, all of the facts, conclusions, statistics, data, information, and views ascertained and gathered by said commission bearing upon the advisability and practicability of the construction of said canal by the Federal Government, and to make or cause to be made any and all arguments deemed necessary by said commission in favor of said canal, and to use their best efforts to further the project of the construction thereof, and to report to the legislature at the session of 1915 all of their acts and doings in the premises.

Resolved further, That said commisssion is also authorized and directed to confer and act with any commission designated or appointed by the State of Wisconsin or any other State interested in the construction of said canal, and to act with any such commission in any and all of the matters hereinbefore set forth.

Resolved further, That the State of Wisconsin is hereby requested and invited to constitute and appoint a like commission for the purpose of consulting and cooperating with said commission hereby appointed for the purpose of furthering the project of constructing said canal.

Resolved further, That the Senators and Representatives in Congress of the United States for the State of Minnesota are hereby requested to urge upon Congress the adoption of an act authorizing the final survey of said canal at a depth of 10 feet, together with the extension of said canal by means of the canalization of the Mississippi River to the cities of St. Paul and Minneapolis, and to urge upon Congress the final construction of said canal by the United States Government.

Resolved further, That a copy of this resolution be sent to the Senate and House of Representatives of the United States and to each of the Senators and Representatives in Congress from this State, and that a like copy be transmitted by the governor of this State, to the governor of Wisconsin, and to the president of the Senate and speaker of the Assembly of the State of Wisconsin.

Approved March 31, 1913.

LETTER OF THE UPPER MISSISSIPPI RIVER IMPROVEMENT ASSOCIATION.

BURLINGTON, IOWA, *June 24, 1914*.

GENTLEMEN: In regard to the matter of appeal of the Minnesota and Wisconsin Canal Commissions from the report of the local board of United States Army engineers at Duluth, Minn., dated May 14, 1913, reporting that the proposed Lake Superior-Mississippi River Canal is not now commercially feasible and practicable.

I had intended and planned, as the representative of the Upper Mississippi River Improvement Association, to attend the hearing of the appeal by your board to be held June 30 instant; but at the last moment, owing to serious illness in my family, I find I will be unavoidably prevented from being present.

At the outset I beg to say that the Upper Mississippi River Improvement Association is composed of representatives of the five States of Minnesota, Wisconsin, Illinois, Iowa, and Missouri, its object being the improvement of the upper Mississippi River and its tributaries and the development of transportation thereon.

For a number of years the project of the proposed canal connecting Lake Superior with the Mississippi River at the mouth of the St. Croix River has received the unanimous indorsement of the association at its annual conventions

attended by the representatives of the five States mentioned, it being considered that said canal would be a great benefit to and afford a large saving in the cost of transporting a vast amount of the commerce of the upper Mississippi River Valley, in connection with the Great Lakes and the Mississippi River.

It is to be regretted that the local board of engineers, in its report, reported that the proposed canal is not now commercially feasible and practicable, although it is shown by reports made by United States Army Engineers that its physical construction and maintenance is feasible and practicable.

Upon careful reading of its report I find some of the statements predicated upon conditions that can be and should be eliminated and corrected, and others that are not founded on fact, and that it was mainly on account of these that the local board arrived at the conclusions it did.

While not for a moment impugning the statements of the local board, it would seem as though they had been unconsciously based on erroneous information in some respects as to the commercial feasibility of the canal. It may, therefore, be well to refer briefly to one or two of the items set out in the report.

Prospective commerce.—This can not be measured by present conditions covering the attitude of the railroads which has long existed in antagonism to inland water transportation. If this is to be allowed to continue, then there would be no incentive to either improve present or to create artificial waterways. But this condition must be eliminated by Federal and State legislation compelling coordination and cooperation between rail and water lines. With this barrier removed the rivers and canals would receive their just share of commercial traffic.

The cost of transportation by canal.—This is greatly overestimated in the report of the local board, especially as to loading, unloading, and transit costs, and deterioration in handling of coal. With modern barges and towing outfit, and proper terminal facilities, the total cost would be very much less than the amount estimated by the local board. If given a fair field, transportation costs on the canal would be much less than the cost by rail between termini on all commodities and would attract a large share of the present and increasing tonnage tributary to it.

The canal would be the connecting link furnishing an all-water route from the Atlantic seaboard to the Mississippi River, via the Hudson River, the Erie Barge Canal, and the Great Lakes, and the reduction of transportation costs that would be obtained thereby would be an economic saving to the people living in the Mississippi Valley.

I refrain from going more into detail or quoting figures and statistics for the reason that the whole subject is exhaustively covered in the appeal of the Minnesota and Wisconsin canal commissioners submitted to your board, in which I heartily concur.

I trust after you have carefully considered the appeal as a whole and compared its statements with those of the local board of engineers in its report, that you will find thereupon that the report should not be concurred in and that the project should be recommended as commercially feasible and practicable.

Respectfully submitted.

Very sincerely, yours,

THOS. WILKINSON,
President.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

STATEMENT SUBMITTED TO THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

GENTLEMEN: In the report of preliminary examination of the proposed Lake Superior-Mississippi River waterway by United States Engineers C. L. Potter, F. R. Shunk, and E. D. Peek (H. Doc. No. 920, 63d Cong., 2d sess.) Minneapolis is designated as the commercial terminus of the project.

Minneapolis is likewise designated as the head of Mississippi River navigation in the $20,000,000 project for the improvement of the upper Mississippi, which is now supposed to be near completion, and by another year it is hoped that this city will be head of navigation of the Father of Waters in fact as in name.

The completion of the so-called High Dam across the Mississippi near the interurban line between Minneapolis and St. Paul, which will carry 9 feet depth

of slackwater into the heart of the Minneapolis milling district, is the final chapter in the extension of Mississippi navigation into the leading manufacturing metropolis of the Northwest and the opening chapter, it is hoped and believed in the development of a substantial and growing volume of commerce on the upper Mississippi. The completion of this dam, with its 15,000 to 18,000 horsepower of hydroelectric development, will doubtless add somewhat to the industrial activity of the city. Minneapolis has for many years owed much to the river. Indeed, it was the Falls of St. Anthony, discovered by Father Hennepin in 1680, that led to the location of the city and afterwards to the development of its great flour milling, lumber, grain, woodworking, and other industries. The city grew up around the falls on the two banks of the river until to-day Minneapolis spreads over 53 square miles of area and has a population which numbered 301,000 in the census of four years ago and is now estimated at 335,000.

To the 30,000 horsepower of the original Falls of St. Anthony, upon which the milling industries largely rely for power, the rapids immediately below add 12,000 to 15,000 for the operation of the Twin City Rapid Transit system, which furnishes the electric street railway service for St. Paul and Minneapolis and for an extensive suburban service extending east from St. Paul to the city of Stillwater and west from Minneapolis to Lake Minnetonka. The further High Dam development of 15,000 to 18,000 horsepower will make about 60,000 horsepower which the Mississippi River contributes to the industrial and transit development of that metropolitan district. And yet that is not all of the story; for much of the 28,000 horsepower of St. Croix Falls, located on the Mississippi tributary which is the major factor in the proposed waterway project, is conveyed by cable into Minneapolis for city lighting and industrial use and still again the large waterpower developed on the Mississippi about 18 miles above Minneapolis, near Anoka, is largely for Minneapolis supply.

The point I wish to convey in referring to this large use of waterpower furnished Minneapolis by the Father of Waters is threefold, thus:

First. That Minneapolis is essentially a Mississippi River metropolis, the river flowing through its heart for a distance of a dozen miles, with the principal industrial and jobbing centers close by on either shore and furnishing the prime source of its industrial and commercial development.

Second. That as a manufacturing center which needs extensive transportation facilities for moving heavy commodities it ranks next after St. Louis and Pittsburgh in the entire area of the Mississippi watershed.

Third. That Minneapolis, now ranking among the 10 largest cities in the country in volume of manufactures and bank clearings, is a growing city in both industries and commerce, and to-day is thoroughly awake to the need and the value of water transportation, which will be afforded by upper Mississippi navigation improvement and the proposed extension into the Great Lakes via the canalization of its important tributary—the St. Croix River.

By authorization of the Minnesota State Legislature at the last session Minneapolis is now issuing $300,000 of municipal bonds to build public docks for the accommodation of river boats which will enter Minneapolis on the slackwater to be provided on the completion of the Mississippi High Dam. Work is already begun under the city engineer for these municipal improvements.

At a convention of Minneapolis manufacturers and jobbers under the auspices of the Civic and Commerce Association of Minneapolis last December, 1,000,000 tons of freight were pledged by Minneapolis business men to a river fleet entering Minneapolis.

Within the past fortnight the chairman of the waterways committee of that commercial body, Mr. Wilbur F. Decker, an experienced business man and engineer, embarked for Europe to make a study at first hand of the successful waterways of Germany, France, and the Netherlands.

Minneapolis has been known for years as the leading flour milling city of the world. The product averages about 18,000,000 barrels a year, of which the bulk, upward of 800,000 tons, is for shipment largely to Atlantic and European markets.

Minneapolis is likewise the largest primary wheat market of the world, handling about 100,000,000 bushels of milling wheat during the grain season. Minneapolis is also the largest primary flaxseed market of the world and the largest manufacturer of linseed oil and oilcake. It likewise leads in other cereal manufactures, such as breakfast foods made from wheat, oats, and barley. Total grain receipts at Minneapolis approximate 160,000,000 bushels per annum. About 80 per cent of the grain received is converted into various

manufactured products named and shipped in finished form, and the remainder, except what is required for home consumption, is shipped as grain.

Formerly the bulk of Minneapolis breadstuff shipments went via the Lakes and Erie Canal and railroads to New York. To-day Montreal is a large receiver of Minnesota grain and flour shipment for export. When Theodore Roosevelt was governor of New York he sent the New York Canal Commission to Minneapolis to inquire of Minneapolis flour and grain men why they had practically cut New York out of their business. The answer was that New York had allowed its canal and river and harbor equipment and terminal facilities to fall under railroad control so that the western shipper could no longer rely upon water transportation into New York. As a result the inducements of Montreal carried away from New York the grain and flour export traffic.

New York is now endeavoring to remedy the conditions by which it lost something like 75,000,000 bushels of western grain per annum, and with a new $120,000,000 Erie Barge Canal and about $20,000,000 additional for public terminal facilities, is bidding for the grain and flour business of the upper Mississippi Valley. New steel barges of 1,000 to 3,000 tons will carry New York merchandise and manufactured products to Buffalo, and return to New York Harbor with Minnesota grain and flour and other cereal and agricultural products. The Great Lakes fleet will convey the cargoes each way between Buffalo and Duluth, a distance of 900 miles, for a charge equivalent to a rail charge for 100 miles. If the proposed Lake Superior waterway to the Mississippi will complete the water route from the New York to the Minneapolis dock, Minneapolis manufacturers and merchants may equip their own merchant fleet and secure a rate into New York about equal to the present rail rate from Minneapolis to Chicago. Such an achievement would certainly open an era of marked industrial and commercial development for Minneapolis and the great agricultural empire tributary.

It seems that the local board of engineers for the upper river and lake district in which this project is located accepted railway terminal charges of 35 to 44 cents for flour and grain as the cost per ton for handling these commodities in loading and unloading the river and canal boats. However, they doubtless have heard by this time that the work can be done much more economically. Instead of using roundabout railway switching at a cost of 35 to 44 cents per ton at each end of the canal and river route, shippers may avail themselves of modern and up-to-date loading machines and methods which to-day load and unload harbor craft at 3 to 5 cents per ton.

It appears that the largest steel and wire company in the United States has filed with the Lake Superior and Mississippi River Canal Commission, of which the governor of Minnesota is ex officio chairman, a plan for an aerial tramway which will convey Minneapolis flour from the mills and load it in the barges on the river at less than 4 cents per ton covering labor, power, repairs, maintenance, and interest on the capital investment. Grain doubtless may be handled with similar economy. Specific gravity aids in the process by reason of the difference of 50 to 100 feet between the elevation of the flour mill and grain elevators above level of the river. Similar costs of transference from canal barge to lake vessel at Duluth-Superior Harbor by floating elevators or otherwise are estimated.

These economies in handling cost, which for the two ends of the waterway, net a saving of 60 to 80 cents per ton on flour and grain shipment, appear to remove completely the obstacle to commercial feasibility of the waterway as applied to cereal commodities and general agricultural products and open the way to a tonnage of 1,000,000 to 3,000,000 tons per annum of such freight for water transportation from Minneapolis and the large agricultural territory tributary.

Minneapolis is specially interested in lake coal, receiving about 2,000,000 tons from the head of the lakes per annum at the present time, and capable of using a vastly greater tonnage if reduced cost of transportation would make such increase available. All manufacturing plants using hydroelectric power require steam auxiliaries during periods of low water. Thus the mills, the street railway, the electric lighting and power company, all have important steam auxiliaries which require coal. The gas company uses a large tonnage. The foundries and factories and office buildings and railway shops require a largely increasing annual tonnage of steam coal, while 335,000 domestic consumers require anthracite even if it costs over $9 per ton.

Some Illinois coal is brought in at a transportation cost of $1.80 to $2.20 per ton by rail; but it is not the equal in quality of the lake coal which comes in from Duluth at 90 cents for soft and $1.25 for hard for rail cost to the coal company. The lake rate of only 30 cents from Lake Erie to Duluth, added to the rail rate to Minneapolis, gives Pittsburgh, Hocking, and West Virginia coal a lower transportation cost from Lake Erie to Minneapolis than the rail rate from southern Illinois mines to Minneapolis.

If the proposed Lake Superior-Mississippi waterway will further reduce transportation cost to the basis on the Monongahela River as described in the reports of the Chief of Engineers, United States Army, or about 50 to 60 cents from Duluth-Superior to Minneapolis, there is no question of a largely increased Minneapolis consumption with a strong resultant stimulus to every line of industry and commerce. A water rate of 80 to 90 cents per ton from Lake Erie into Minneapolis would be equivalent to moving the Lake Erie coal yards, with their millions of tons of coal storage, within a distance of about 100 miles by rail from Minneapolis. It would largely solve the chief obstacle to northwestern industrial development and material progress—namely, the lack of coal mines. It would also help the consumer toward the solution of the most bitter problem in the matter of high cost of living, to wit, the high price of coal. You are perhaps aware that we have more cold weather in the wintertime in the Northwest than is enjoyed in some other parts of the country—at least a higher quality at a lower temperature—and that we can use lots of coal in our business. The Pennsylvania coal interests understand this also, and we sometimes suspect that they profit by our necessities. We in Minnesota grow and produce and make about everything on earth except bananas and coal. We can spare the bananas, but we are now using 2,000,000 tons of coal in Minneapolis alone and can see our way to use vastly more if your honorable Board of Engineers on Rivers and Harbors will help us solve the transportation question, which is indeed the major solvent of the burning issue of cheap and abundant coal.

Along with coal from Lake Superior will come iron and steel and cement from the new Minnesota Steel Co., a Duluth subsidiary of the United States Steel Corporation, which expects to have 48 steel mills, coke ovens, blast furnaces, and cement works turning out steel materials and finished products at Duluth next season. Minnesota last year shipped 36,000,000 tons of iron ore to Lake Erie for transference to the Ohio and Pittsburgh furnaces and rolling mills. Hereafter a substantial share of this iron ore—which is about two-thirds of the total American iron-ore production—will be converted into pig, steel billets, steel plates, and shapes and sheets by Minnesota labor on Minnesota soil. Minneapolis has large foundries, hardware and farm implement shops and factories which will use much of the Duluth product. Also a large subsidiary of the United States Steel Co., the American Bridge Co., has extensive works in Minneapolis, which will use steel plates, shapes, and pig from the Duluth steel mills. All this means a heavy tonnage of iron and steel from Duluth to Minneapolis. The Duluth steel plant is located on the Duluth-Superior Harbor with extensive dockage facilities only a few miles across the harbor from the lake mouth of the proposed canal, while the river terminus of the project is Minneapolis, which is likely to be the largest single consumer of Duluth steel. The barges which bring the coal, iron, and steel from Duluth-Superior to Minneapolis may return with cargoes of limestone from Minneapolis stone quarries for the Duluth blast furnaces and cement works; for a ton of limestone is needed for each ton of pig, and the banks of the Mississippi at Minneapolis consist of limestone ledges.

Thus Minneapolis is directly interested industrially and commercially in the completion and success of the proposed waterway as an important link in its general transportation system. In a way the proposed waterway will make Minneapolis the head of Great Lakes commerce, just as it makes Duluth the ultimate head of Mississippi River navigation. Opening the channel of commerce between lake and river extends the volume of usefulness of both. It creates through commerce between lake and gulf and creates a channel of trade between North and South, which is an absolute necessity, if the ambitions of your Rivers and Harbors Board for the development of commerce on the Mississippi and the justification thereby of the huge investment of the Federal Government therein shall ever reach fruition. I want to say that my district will do all in its power, and that will be no small part, in cooperating with your board to develop commerce on the Mississippi River. We believe the day is come when the great waterways of our country are required to cooperate with railways, as they are so successfully doing in Germany—yes, and on the Monongahela

and Ohio in our own country—to develop industry and commerce. Even so pronounced a railway leader and authority as James J. Hill, of my State, has appeared at recent waterway congresses and demanded waterway development as the dependence of the Nation in coping with the Nation-wide problem of traffic congestion and high living cost. I am not one of those who believe in "pork-barrel" demands upon the Federal Treasury for local ends; but as the Great Lakes and Mississippi are great Federal highways of navigation over which only the Federal Government has control, and as there is no legal method of securing a much-needed commercial link between these great waterway systems except by appeal to your honorable board, I support the petition of my State and municipality in the case of this project with a clear conscience and with confidence that you will give the project your earnest and most thoughtful consideration. I hope, at least, that you will vote the project that thorough and up-to-date survey which, as I understand, it has not for some years received, and that the fullest engineering information and commercial data of your board, based on such expert survey, will be submitted by you to the consideration of Congress.

NECESSITY OF WATER TRANSPORTATION TO SECURE JUST RATES FOR THE TWIN CITIES.

Duluth and Chicago have low-cost water transportation to hold railroad rates down to a just and reasonable basis. Minneapolis, St. Paul, Stillwater, and other river points, which have no water transportation for east and west business, are compelled to accept such rates as the railroads see fit to levy.

The result is that the Twin Cities and other inland points suffer radically in comparative rail rates, as against the rates afforded Duluth and Chicago by influence of lake transportation. The law authorizes the Interstate Commerce Commission to depart from the principle of parity in adjusting rates whenever water transportation competes with rail and makes lower rates for all sections bordering on lakes and streams that enjoy low water rates. Against such a condition the only remedy is to give water transportation, if practicable, to the section suffering from high and discriminating rail rates.

How this condition has worked against the Twin Cities in favor of Chicago and Duluth is a matter of history. Take the comparative rates on first-class merchandise as an illustration of the workings of this principle and of the practices of the railroads in taking advantage of their opportunity to tax all the traffic will bear.

In 1892 the rate on first-class merchandise from New York to the Twin Cities was only 5 cents per hundred over the rate to Duluth. In 1896 it was 14 cents. From 1901 to 1907 it was 15 cents. In 1913 the differential in favor of Duluth was raised to 21 cents. In 1914 the differential was raised to 28 cents. Finally, on March 25, 1914, the four railroads running between Duluth and the Twin Cities issued new tariffs raising the local rate from Duluth to the Twin Cities to 41.4 cents on first-class merchandise. On the other merchandise classes there has been a similar percentage in the growth of the differential against the Twin Cities in favor of Duluth. The differential on fifth class advanced against the Twin Cities from 2 cents in 1892 to 7 cents in 1913, and the local roads now propose as the Duluth-Twin City rate 20.7 cents per hundred.

The rate from New York to the Twin Cities has been advanced not only comparatively as against Chicago and Duluth, but actually. The first-class rate from New York to the Twin Cities advanced from 75 cents in 1901 to 83 cents in 1907, and it is now demanded to jump the rate for 1914 to $1.03.

Against such discrimination there is only one remedy, and that is to extend the benefits of water transportation via the Lake Superior-Mississippi waterway to the Twin Cities. Such waterway extension will benefit not only the Twin Cities but the entire country tributary. The lower transportation costs which the proposed project will produce will have a widespread effect in lowering the whole basis of railroad tariffs for the great industrial empire of which the Twin Cities are the chief distributing center.

How widespread may be the benefits, for example, of rate reductions to my own district of Minneapolis you will readily perceive in connection with the fact that Minneapolis is the world's leading primary wheat market, leading primary market for flaxseed, the leading distributing point for agricultural implements, and the greatest flour milling center. Reduced rates on such staples from Minneapolis to the Great Lakes benefits the producers of at least four tributary States.

RESOLUTION ADOPTED BY THE BOARD OF DIRECTORS OF THE ST. PAUL ASSOCIATION OF COMMERCE AT A MEETING HELD WEDNESDAY, JUNE 3, 1914.

Whereas there has been under consideration by the Government of the United States for a number of years the practicability of the construction of a barge canal connecting Lake Superior and the Mississippi River by way of the St. Croix River; and

Whereas several examinations of the most feasible route for such a canal have been made under the direction of the War Department, with the result that the route via the Brule and St. Croix Rivers has been determined by each of such reports to be engineeringly feasible and practicable, and that the cost of such canal is estimated at $7,815,000; and

Whereas the commercial interests of the city of St. Paul, as represented formerly by the St. Paul Jobbers and Manufacturers' Association and latterly by the St. Paul Association of Commerce, have always favored the construction of said canal: Now, therefore, be it

Resolved by the St. Paul Association of Commerce, That it does hereby reiterate its approval of the construction of the said projected canal from Lake Superior to the Mississippi River, as described above, and does hereby direct the president to appoint a representative to appear before the General Board of the United States Army Engineers, at the hearing upon the appeal from the report of the local board of engineers, at Washington, D. C., on June 30, 1914, and on behalf of this association submit to such board such statistics, statements, and arguments in favor of the construction of said canal as may be appropriate, and to take such further steps as may be necessary to promote the construction of said canal; and be it further

Resolved, That a copy of these resolutions be forwarded to the Hon. Knute Nelson and the Hon. Moses E. Clapp, Senators, and to Hon. Fred C. Stevens, Representative in Congress from the fourth district, and to Hon. Geo. R. Smith, Representative in Congress from the fifth district of the State of Minnesota, requesting them to take such action as in their judgment will best promote the construction of said canal by the United States Government.

[SEAL.]

APPEAL OF MINNESOTA AND WISCONSIN CANAL COMMISSIONS TO THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS, WASHINGTON, D. C., IN THE MATTER OF LAKE SUPERIOR-MISSISSIPPI CANAL—GENERAL DATA AND ARGUMENT FOR CONSTRUCTION OF CANAL.

(June 13, 1914.)

[George H. Sullivan, Stillwater, Minn., counsel for Minnesota Canal Commission; E. F. Ackley, Chippewa Falls, Wis., counsel for Wisconsin Commission.]

PROJECTED CANAL FROM LAKE SUPERIOR TO MISSISSIPPI RIVER VIA BRULE AND ST. CROIX RIVERS.

Appeal of Lake Superior and Mississippi Canal Commission of the State of Minnesota from the report of the local board of United States Army Engineers at Duluth, Minn., dated May 14, 1913, reporting that the proposed canal is not now commercially feasible and practicable.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C.:

The Lake Superior and Mississippi Canal Commission of the State of Minnesota having heretofore duly appealed in writing from the report of the local board of United States engineers at Duluth, dated May 14, 1913, in and by which report it was determined by said local board of engineers that the proposed canal from Lake Superior to the Mississippi River via the Brule and St. Croix Rivers is not now feasible or practicable, submits the following statements, data, and statistics, with the request that upon due consideration thereof said report of said board of engineers at Duluth be not concurred in by the Board of Engineers for Rivers and Harbors. The Lake Superior and Mississippi Canal Commission of the State of Wisconsin joins with the Canal Commission of the State of Minnesota in the submission of this statement and in the request that the report of the local board be not concurred in, and like

request is also made by and on behalf of the Association of Commerce of the city of Minneapolis, the Association of Commerce of the city of St. Paul, and also all other cities, municipalities, representative commercial bodies and citizens of the upper Mississippi Valley and the Northwest who appeared before or who addressed communications to the local board of engineers in favor of the project.

For resolutions of Minnesota and Wisconsin Legislatures creating canal commissions of such States see Exhibits 14 and 15.

DESCRIPTION AND OUTLINE OF PROJECTED CANAL.

1. The project under consideration is the construction of a canal from Allouez Bay, which is a part of the Duluth-Superior Harbor on Lake Superior, to the mouth of the St. Croix.

Distance from the mouth of St. Croix to the Allouez Bay, the Superior end of the canal, 210 miles.

Distance from mouth of St. Croix on Mississippi River to St. Paul, 27 miles; to Minneapolis, 40 miles; and to various Mississippi ports and terminals.

Open-river navigation from Taylors Falls on the St. Croix to Minneapolis, on the Mississippi, 92 miles.

Canalized section from Duluth-Superior Harbor to Taylors Falls, 160 miles.

Minneapolis to end of canal, Allouez Bay, 250 miles.

Elevation of summit level above Lake Superior, 411 feet.

Elevation of summit level above Mississippi at mouth of St. Croix River, 344 feet.

Locks and dams: Sixteen locks 170 by 35 feet and eight hydraulic lifts, 6 feet low-water depth on miter sills.

Waterpowers: Engineers estimate 21,000 horsepower on Brule and St. Croix, not including 15,000 to 18,000 horsepower on partially completed High Dam on Mississippi between St. Paul and Minneapolis; other estimates by citizen engineers up to 50,000 horsepower.

Cost of project (not including hydroelectric development), $7,815,000.

Cost for operation, maintenance, and 3½ per cent interest on investment, $420,000 per annum.

LENGTH OF CANAL.

2. The length of the canal from Lake Superior is given in the report of the local board as 222 miles from the Duluth Canal to the mouth of the St. Croix River. This is an error. The distance should be calculated from the junction of the canal with Allouez Bay, which is a part of the Duluth-Superior Harbor, and which point is the northern terminus of the canal. This is clearly stated in the reports of the United States Army engineers, House Document No. 204, Sixty-first Congress, second session, pages 4–7. This makes the distance from the city of Minneapolis via the Mississippi River, St. Croix River, and the northern terminus of the canal 250 miles instead of 262 miles.

PROPOSED CANAL ENGINEERINGLY FEASIBLE TO CONSTRUCT AND OPERATE.

3. That it is entirely feasible and practicable to construct, maintain, and operate the proposed canal is thoroughly demonstrated by the several reports made by United States Army engineers who have made several examinations and surveys of the route pursuant to congressional action. The details of such examinations and surveys, together with data and statistics as to the cost of construction, maintenance, and operation, will be found in the following reports:

August 30, 1909, report of Lieut. Col. Graham D. Fitch, Corps of Engineers, of preliminary examination in compliance with river and harbor act of March 3, 1909. (H. Doc. No. 304, 61st Cong., 2d sess.)

June 14, 1899, report of Maj. Clinton B. Sears, Corps of Engineers, in compliance with river and harbor act of March 3, 1899. (H. Doc. No. 59, 56th Cong., 1st sess.)

March 10, 1896, report of Maj. Sears with detailed report by Asst. Engineer John Krey. (H. Doc. No. 330, 54th Cong., 1st sess., pp. 2390–2454 of Annual Report of Chief of Engineers, 1896.)

Each of the foregoing reports finds the projected canal feasible and practicable to construct; that a 6-foot canal can be constructed and operated.

Cost of construction, $7,815,000.

Cost of operation and maintenance and 3½ per cent interest on the investment of the Government, $420,000 per annum.

No Government or other engineer has ever reported that the canal is not practicable from an engineering standpoint.

COMMERCIAL FEASIBILITY OF CANAL.

4. The only question in issue is the commercial expediency or feasibility of the canal, or as stated by the local board at section 30 of the report:

"Will the saving in freight to the public on the probable commerce through the canal be equal to the $420,000 annual expense to the Government for operation, maintenance, and interest on the investment?"

In other words, Can the canal compete with the four lines of existing railways from Duluth-Superior to the Twin Cities and effect a saving of $420,000 per year to the public?

IMPORTANCE OF THE SUBJECT.

5. It is elementary that the cost of all transportation in the last analysis is borne by the consumer and is a tax from which none can escape. The greatest tax borne by the individual citizen of the United States is the tax paid for railroad transportation in the form of railway freight. For the year 1906–7 the total gross revenue of the railways of the United States was $2,875,689,500, or about $30.86 per capita, or a tax of $154.30 per annum for each family of five persons.

In the same year the average amount per capita collected by the Government of the United States in tariff duties on imported goods was $3.84. So the railway transportation tax was more than eight times as great as the tariff tax. During the same year the average receipts of the United States Government from all sources was $9.84 per capita.

In the nature of things it is impossible for the individual to know or ascertain how much he pays for transportation tax or tariff tax. He is paying a slight amount of each form of such whenever he buys any article which has been transported by railway or affected directly or indirectly by the tariff. However, he usually remembers the amount he pays directly in the city, county, or State taxes, and has a receipt to refresh his memory thereof. In the year 1902 the total revenues and taxes paid to all the States, counties, cities, towns, villages, districts, and all other political subdivisions in the whole United States, added to the total revenues of the United States Government for that year, amounted to $1,791,895,522.

For the same year the gross earnings of railways amounted to $1,922,703,896, showing that the transportation taxes paid to railways in that year exceeded all other taxes paid for all public purposes in the United States by the enormous sum of $130,808,374.

The bureau of railway news and statistics of the United States records a railway freight movement for the year ending June 30, 1913, of 300,000,000,000 ton-miles at an average rate of 7.27 mills per ton-mile, or total freight bill of $2,181,000,000. The same authority gives total gross railway revenue for the year 1913 as more than $3,000,000,000.

While the tax exacted from the consumer may be estimated as above at $30.84 per capita, it is utterly impossible to even approximate the total toll or amount per capita exacted from the producer whose products are diminished in selling price by deductions made for freight from place of production to consumption. However, the above considerations clearly indicate the immense tax upon producer and consumer occasioned by railway transportation. It would, therefore, seem to be of the highest importance that every possible means available be resorted to which will result in lessening this enormous railway transportation tax which bears so heavily upon each individual citizen.

CANAL OR WATERWAY V. RAILWAY TRANSPORTATION.

6. Authorities on transportation, as we understand it, agree to the proposition that it requires very much less power to move the same amount or weight of freight upon a waterway or canal than by any other method of transportation. The equivalent of a horsepower can move 2 tons at the rate of three miles per hour on a fairly level wagon road, 15 tons in a car on a railway, and 90 to 100 tons in a boat of proper shape on a waterway of width and depth

adapted to its use. The average rate received by railways in the United States in 1907 was 7.82 mills per ton-mile; in 1913, 7.27 mills per ton-mile.[1]

RAILWAY RATES TEND TO INCREASE.

7. Current history clearly indicates that the tendency of railway rates is to increase rather than decrease. By elimination of grades, increase in efficiency, and capacity of equipment of locomotives, improvements in terminals, and other economies effected by railways in recent years, it would seem that the minimum cost of railway transportation was reached last year. Through every part of the country railways are insistently clamoring for an increase in rates. They cite figures and statistics indicating their inabilty to operate railways at present rates without loss such as they claim will result in inefficient service or ultimate bankruptcy. They assert that it is impossible to raise capital to make needed extensions and improvements, so that it may well be assumed that the outlook is for increased rather than decreased railway rates. (Final Report National Waterways Commission, page 575.) There are pending applications of railways to raise the rates between the Twin Cities and Duluth and also an application to raise lake and rail rates from Twin Cities to eastern points. There are pending before the Interstate Commerce Commission applications of the railways of the country for a horizontal increase in rates of 5 per cent. A horizontal raise of 5 per cent would add to the freight railway tax to be paid by the public the enormous sum of $109,050,000 annually. As indicated hereafter, that amount and more could be saved to the public by removing the railway shackles from water-borne commerce, permitting waterways to perform their natural function of carrying freight which should be carried on water at a saving to the public.

8. The average rate for bulk freight on the Great Lakes is eight-tenths of a mill per ton-mile. It is estimated by Army engineers that when the improvements on the Ohio River are finished transportation can be conducted thereon for one-half a mill per ton-mile. On the old Erie Canal, under conditions decidedly unfavorable to low cost, such as old-type wooden boats of small tonnage capacity, antiquated towing methods, absence of adequate terminals and modern machinery for loading and unloading, railway discriminations against and practically boycotting of canal freight, the rate was 2 mills per ton-mile. On the new Erie Canal, with modern terminals and terminal facilities, controlled by the State, with canal traffic protected by the State and United States, reliable authorities estimate the cost per ton-mile will not exceed from one-half to 1 mill. Rates on waterways where the most modern type of boat is used, with adequate terminals and machinery for loading and unloading, by consensus of all transportation authority in the United States and Europe, ought not to exceed from one-half a mill to 2 mills per ton-mile.

It is in the nature of the case that water transportation is less costly and more economical than railway transportation, unless unnatural and artificial obstacles prevent the use of the waterways under favorable conditions. The expense of equipping a transportation line, at least so far as the boats are concerned, is but trivial in comparison with that of constructing a railway. Waterways cost less to maintain; have almost unlimited capacity, and hence are not liable to congestion, and frequently deliver freight more rapidly than railways. Waterway transportation has a decided advantage in that the waters are free, and anyone having the requisite capital and ability can engage in the business. This tends to create competition and to prevent monopoly. Indeed, it may be asserted, as a general proposition, that in any highly advanced country it is extremely desirable that means be afforded for the carriage of freight not only by rail but by water as well. It is a matter of common occurrence that in years of great crops or unusual prosperity the railways of the country have been unable to provide for the prompt and efficient performance of their duties as common carriers. Stagnation and congestion of traffic occur, entailing enormous losses. The existence of this condition affords an independent argument for the development of transportation routes by water, even in localities where shippers mainly depend upon railways.

[1] For table of comparison of rail rates in United States and water rates in Europe, showing water rates much lower than rail, see Exhibit 11, Final Report National Waterways Commission, p. 568.

REPORT OF LOCAL BOARD FOUNDED UPON ARTIFICIAL AND PREVENTABLE OBSTACLES.

9. The report of the local board does not find that transportation by canal is economically inferior to railway transportation, nor that canal transportation is not cheaper than railway transportation, but finds in effect that canal transportation will be hampered and prevented by existing artificial, unnatural, and wholly unnecessary obstacles, mainly the result of railway hostility and the manipulation of agencies controlled by railway ownership of terminals, terminal facilities, and general control of freight at points or origin and destination; railway discriminations against water-borne traffic and practices, amounting practically to boycotting water traffic. It is because of the artificial, unnecessary, and preventable obstacles found to exist by the local board that they report the canal to be not commercially feasible. These obstacles the local board assumes will continue to exist, but we think it is demonstrated herein that all of the obstacles to water transportation may and will be prevented or swept aside.

ECONOMIC LOSS TO PUBLIC AND CONSUMER BY REASON OF RAILWAYS DIVERTING FREIGHT FROM WATER TO RAIL WHICH COULD BE CARRIED CHEAPER BY WATER.

10. It will be conclusively shown herein that a large percentage of freight, which could be transported by water at less cost than by rail, is diverted to rail by the indefensible boycotting of water traffic resorted to by railways. The resulting loss of the difference in cost between water and rail transportation is borne by the consuming public. The railway makes up any loss occasioned by water competition from higher freight charges to other points not affected by water competition, but the public pays the whole railway freight bill.

If the amount of freight so diverted from water to rail be only 15 per cent of the total railway freight paid in 1913, it would be $327,150,000 annually. If the difference in cost between rail and water transportation be only 33 per cent the loss to the public by reason of such unnatural diversion from water to rail amounts to the enormous sum of $109,050,000 per annum.

If the railways would permit or be required to allow freight to go by water which can and would naturally be transported by water cheaper than by rail, it is quite possible there would be no necessity of increasing present railway rates.

FINDINGS AND CONCLUSIONS OF LOCAL BOARD.

11. The local board of engineers arrive at the conclusion that the proposed canal is not commercially feasible by the following findings, statements, reasoning, and conclusions, which may be grouped as follows:

DECADENCE OF INLAND WATERWAYS AND CANALS.

A. The board calls attention to the general decline in inland waterway and canal traffic. They point to the decline of traffic on the Erie Canal from 4,608,581 tons carried in 1880, being 18 per cent of the total freight moved by rail and canal between Buffalo and New York, to 2,385,491 tons in the year 1906, an actual decrease in freight of nearly 50 per cent and a decrease in total freight carried between Buffalo and New York from 18 per cent to 3 per cent. They quote figures purporting to show a decline of traffic on the upper Mississippi River of 85 per cent from 1889 to 1906. They also quote figures showing decline of traffic on the Ohio River, lower Mississippi, Missouri, and Illinois Rivers, and say that in 1909, 4,500 miles of canals had been constructed in the United States, of which 2,444 miles, costing $80,000,000, had been abandoned, and at section 112 say that the ultimate fate of the proposed canal, if constructed, would only add to the figures of abandoned canals. The only inference possible to draw from the statements of the local board with reference to inland waterways on canals and rivers is that traffic thereon is no longer profitable or practicable; that it is dying out and that inland waterway projects are unworthy of improvement or of assistance from the General Government or any source and consequently railway transportation is better, cheaper, and to be preferred to inland waterway transportation.

In passing we note that in citing figures showing decline of traffic on the upper Mississippi River the local board (sec. 43) gives the figures of the tonnage as follows:

1889	3,947,364
1906	595,885

The United States Army engineer's office at Rock Island, in response to an inquiry made by the Minnesota commission, in a letter addressed to George H. Sullivan, dated April 16, 1914, gives the following figures showing details and total tonnage on upper Mississippi River for the years 1889 and 1906, as follows:

	Tons.
1889—Logs and lumber	3,760,389
Miscellaneous freight	320,743
United States material	485,438
	4,566,579
1906—Logs and lumber	2,630,141
Miscellaneous freight	1,001,867
United States material	215,311
	3,847,319

These figures show a decline in total traffic of 719,260 tons, or 15 per cent, instead of a decline of 3,351,479 tons, or 85 per cent, as stated in section 43 of the report of the local board.

The decline in the item of logs and lumber is 1,130,257 tons, or 24 per cent.

It is well known that shipments of logs and lumber have declined because of extinction of the pine forests of Minnesota and Wisconsin.

But it appears that there was an actual increase in all other freight on the upper Mississippi during the period in question: In 1889, miscellaneous freight and United States material, 806,181 tons, to 1906, miscellaneous freight and United States material, 1,217,178 tons, or an increase of practically 50 per cent.

HANDLING AND TERMINAL CHARGES AND RAILWAY HOSTILITY TO WATERWAYS AND CANALS.

B. With reference to this particular project the local board finds certain terminal charges, such as 25 cents per ton for loading coal upon and 25 cents for unloading coal from canal barges; 25 cents per ton deterioration in value of coal due to one extra handling by clam shell over rail transportation; 25 cents for delivery from canal dock to carload consumer; certain elevator charges for loading and unloading grain; and the existence of certain terminal, dock, and storage charges upon freight and general merchandise which prevent freight from being transported upon the canal at as low a rate as it may be carried upon existing railways. In this connection the board also find as reasons why the canal can not carry general merchandise or package freight, including salt, sugar, groceries, cotton and woolen goods, etc., that lake vessels are owned by railway companies and therefore will not deliver freight to or accept freight from canal boats or barges, except at local or higher rates than when such freight is delivered to or received from railway lines. That the canal carriers will be deprived of all freight known as lake-and-rail freight, i. e., freight originating upon railways either at eastern or western points, a part of the carriage of which is by rail and part by lake, on account of discrimination against canal freight by railways.

It is found in effect that through their control and ownership of terminals, docks, and storage warehouses at Duluth, Superior, Buffalo, and other lake harbors, ownership of lake vessels, canal terminals, and boats on the Erie Canal, agreements between eastern and western railways and other agreements between railways, such railways can and will divert all traffic to rail and lake lines under common control of railways. That ownership by railways of terminals permits them to make a through rate for the entire carriage from the point of origin of freight to its destination, including the terminal charges, storage charges, dock charges, loading and unloading charges, so that the rate for delivery of freight from origin to destination, including all charges, is lower than it is possible to transport the freight through an independent agency such

as the proposed canal, transporting the freight only at one end or upon one portion of the entire route, and being subject to terminal charges and other exactions controlled through railway influences in the manner described so as to effect any saving of freight at all when such charges are added and a local or higher rate exacted by the railways and lake carriers controlled by railways transporting such freight for the remainder of the distance. While it is clear that freight transported by canal from Duluth-Superior to the Twin Cities originating at eastern points or freight originating at the Twin Cities, or tributary thereto, transported over the canal destined for eastern points, only requires one extra handling, that is, on westbound freight, the extra handling from lake carrier to canal boat, and on eastbound freight the extra handling from railway car to canal boat of that portion not loaded directly from mill dock or elevator to canal boat, yet the terminal charges for loading and unloading assumed in the report seem to the local board sufficient to deprive the canal of all freight. Such charges, in fact, are cited by the local board as demonstrating that freight will not and can not move over the projected canal except at a greater rate than such freight is now moved by rail or by existing lake and rail rates. In effect it is also found that the refusal of railways to make joint and other rates or to divide traffic upon the basis upon which lake carriers and railways which control such lake carriers now divide the same, or upon any equitable basis, is found as one of the insurmountable obstacles to the success of the projected canal.

In other words, the hostility of existing railway lines to water traffic and the various methods by which railways have in the past destroyed inland waterways and canal traffic, including traffic upon all of the rivers and canals whose traffic has been partially or wholly destroyed, according to the report of the local board are found and assumed as conditions that will continue as insurmountable obstacles to freight traffic upon the waterways and canals of the whole country and of such a character as to absolutely prohibit the proposed canal from receiving or transporting any freight whatsoever.

TOTAL TONNAGE AVAILABLE TO CANAL.

C. The board finds the total bulk freight or tonnage available for transportation on the proposed canal and of the character usually transported by canal, such as coal, iron, steel, general merchandise, flour, grain, etc., to be 3,295,000 tons. This tonnage is calculated on the basis of the tonnage actually carried by railways between the Twin Cities and Duluth-Superior for the year ending June, 1912, as follows:

	Tons.
Hard and soft coal and iron	1,954,568
Flour	223,170

The railroads in question estimate the foregoing figures for hard and soft coal and iron constitute 80 per cent of the bulk tonnage moving south. The board then find the additional local population of the canal zone amounts to 22 per cent of the population of the termini and hence add 22 per cent to the actual coal shipments of 1912 and 12½ per cent to the flour tonnage; then assuming the result to be 80 per cent of the total bulk freight moved between the Twin Cities and Duluth-Superior, find the total bulk shipments for the year 1912, allowing the above increases of 22 per cent for coal and 12½ per cent for flour for the local consumption of the canal zone, as follows:

	Tons.	Percentage of all.
Soft coal	1,724,000	52.3
Hard coal	658,200	20.0
Iron and steel	2,400	.1
Flour	251,400	7.6
Grain	329,500	10.0
General merchandise	329,500	10.0
Total	3,295,000	100.0

The figures and percentages so arrived at are assumed by the board as the total tonnage tributary to the canal.

We do not agree that the figures or results or that the method of such computation is correct nor that the question should turn upon the tonnage of 1912. We think the coal tonnage and bulk shipments are largely in excess of the amount estimated by the board for the year 1912.

We note that while the total shipments of hard and soft coal for 1912, after adding 22 per cent for increased consumption in Canal Zone, are found to be—

	Tons.
Soft coal	1,724,000
Hard coal	658,200
Total	2,382,200

Yet at section 69 the local board says actual shipments of coal from Duluth to Twin Cities and Minnesota Transfer for 1912 are stated to be—

	Tons.
Hard coal	1,724,000
Soft coal	658,200
Total	2,382,200

Adding 22 per cent to the actual shipments, according to method of local board, increases the available coal tonnage for 1912 524,084 tons, or a total of 2,906,284.

We reproduce statement received from Minnesota Railway and Warehouse Commission in April, 1914, of total tonnage actually shipped by railways from head of Lakes to Twin Cities for years ending June 30, 1909, 1910, 1911, 1912, and 1913:

	Northbound.	Southbound.	Total.
1909.			
Northern Pacific Ry	368,507	813,780	1,182,287
Chicago, St. Paul, Minneapolis & Omaha Ry	143,168	324,773	467,941
Great Northern Ry	238,274	555,507	793,781
Total	747,929	1,694,060	2,444,009
1910.			
Northern Pacific Ry	433,940	946,872	1,380,812
Chicago, St. Paul, Minneapolis & Omaha Ry	137,867	379,759	517,626
Great Northern Ry	261,640	598,202	859,842
Total	833,447	1,924,833	2,758,280
1911.			
Northern Pacific Ry	466,166	1,097,676	1,543,842
Chicago, St. Paul, Minneapolis & Omaha Ry	137,213	417,137	554,350
Great Northern Ry	271,039	722,835	993,874
Total	854,418	2,237,648	3,092,066
1912.			
Northern Pacific Ry	445,360	1,447,840	1,893,200
Chicago, St. Paul, Minneapolis & Omaha Ry	77,676	438,487	516,163
Great Northern Ry	230,406	844,394	1,074,800
Total	753,442	2,730,721	3,484,163
1913.			
Northern Pacific Ry	663,480	1,637,264	2,300,744
Chicago, St. Paul, Minneapolis & Omaha Ry	202,784	371,823	474,607
Soo Line[1]	47,815	169,342	217,157
Great Northern Ry	282,885	714,891	997,776
Total	1,096,964	2,893,320	3,990,284

[1] From July 15, 1912, to June 30, 1913.

This shows increase in total shipments in four years from 2,444,009 tons to 3,990,284 tons, or 63 per cent, or more than 15 per cent per annum. It shows total shipments 1912 of 3,484,163 tons. It shows that the Soo line management did not consider railway competition between head of Lakes and Twin Cities as any sufficient bar to the building of a new line of railway in 1913. We insist

that the total tonnage available for the canal should be determined not on the basis of 1912 but on the basis of what it will be at the time of the completion of the canal, say 1920. The annual increase for the four-year period prior to 1912 being more than 15 per cent, in 1920 it should be more than 120 per cent over the 1912 figures. This would more than double all the figures of the local board and would give an available coal tonnage of approximately 5,000,000 tons and other tonnage in proportion.

AVERAGE FREIGHT RATE ON PROPOSED CANAL.

D. The local board estimates the freight rate on the proposed canal would be the same as the freight rate on the Erie Canal, which the board finds to be 3 mills per ton-mile, and taking the distance at 260 miles finds the average canal rate will be 78 cents per ton. As shown later herein this rate should not exceed 2 mills per ton-mile, or 50 cents per ton.

EXISTING RAIL RATES BETWEEN DULUTH-SUPERIOR AND ST. PAUL AND MINNEAPOLIS.

E. The board finds existing rail rates between Duluth-Superior and St. Paul and Minneapolis, January, 1913, as follows:

Coal, hard	$1.25	Iron, bar or band	$1.50
Coal, soft	.90	Iron, pig	1.12
Wheat	1.00	Lime	1.20
Flour[1]	1.00	Rails	.90
Coarse grain	1.00	Salt	1.00
Lumber	1.20	Sand	1.00
Structural iron	1.50	Stone	1.00
Building stone	1.00	Stone, crushed	.80
Iron castings	2.00	Sugar	1.60
Cement	1.00		

LOCAL BOARD THEN DETERMINED AVERAGE RAILROAD RATES ON ALL COMMODITIES.

F. "The average rail rate for iron may be taken as the average rate on the five kinds, or $1.40. The general merchandise rate may be taken as the average on stone, cement, lime, salt and sugar, or $1.16. The average rate on all freight may thus be determined:

	Tons.	Rate.	Amount.
Soft coal	1,724,000	$0.90	$1,551,600
Hard coal	658,200	1.25	822,750
Iron and steel	2,400	1.40	33,600
Flour	251,400	1.00	251,400
Grain	329,500	1.00	329,500
General merchandise	329,500	1.16	382,220
Total	3,295,000	.....	3,371,070

$\frac{3371070}{3295000}$=$1.024, the average rail rate on all commodities."

In determining this rate the board multiplies the number of tons of each commodity shipped in 1912 by the rate on such commodity and after adding the amounts together divide the total by the number of tons, and thus find an average rate of $1.024. In passing we note the general merchandise rate is taken as the average rate on stone, cement, lime, salt, and sugar; but there is no such computation of the amount of the several commodities included in general merchandise, in reaching the average stated, such as is used with reference to all the other commodities. But the rate per ton for each of the several commodities included under the term "general merchandise" are added together and divided by one number of such commodities instead of the total amount shipped. This method is obviously improper and the result inaccurate because not based upon proper data or computations. Sugar takes a rate of $1.60 a ton and is one of the largest items in the list.

[1] One road charges $1.50.

AMOUNT OF FREIGHT CANAL MUST TRANSPORT TO BE COMMERCIALLY FEASIBLE.

G. The local board says: "If the average canal rate of 78 cents be subtracted from the average rail rate, $1.024, it leaves $0.244 as the difference which goes to reimburse the United States for its canal expenditure." The board therefore finds that the canal must haul annually 1,647,500 tons, or 50 per cent of the estimated traffic for the fiscal year 1912, at a saving of $0.244 per ton in order to be commercially feasible. To the claim that the total freight will increase from year to year the board points to the history of the Erie Canal and other waterways as showing there will be no increase in canal traffic, but, on the contrary, a diminution or loss therein. The board says that a reduction of 10 cents per ton in freight will not secure the traffic for the canal because the service on the railroads is better and quicker.

BOARD FINDS CANAL WILL NOT CARRY COAL OR ANY COMMODITY OR FREIGHT WHATSOEVER.

H. The board then takes up the several commodities usually carried on canals, such as coal, iron, steel, grain, flour, etc., upon the authority of Julius Barnes, Messrs. Little and Hall, and the authorities quoted in the report, and proceeds item by item to find that no commodity or freight whatever can be carried on the canal at any saving whatever below existing railway rates. In fact, the board finds that when the extra handling, loading, and unloading charges occasioned by the use of canal boats as a means of transportation are considered, that no commodity whatsoever could be transported on the canal without losses as follows:

Losses on canal transportation.

	Cents per ton.
Soft coal	73
Hard coal	3
General merchandise	12
Grain	13½–41
Flour	11

And these losses all without any account being taken of the loss to the United States or cost of maintenance, operation, and 3½ per cent on the investment equaling $420,000 a year, or 25 cents per ton on 1,647,500 tons.

LOSSES FOUND BY LOCAL BOARD WHOLLY DUE TO TERMINAL CHARGES, COST OF LOADING AND UNLOADING, RAILWAY DISCRIMINATING AGAINST WATER FREIGHT, AND REFUSAL OF RAILWAYS AND LAKE CARRIERS TO MAKE THROUGH JOINT RATES.

I. It will be noticed that the average canal rate is found by the board to be 78 cents and the average rail rate at $1.024. Therefore it is clearly seen that the losses in canal transportation by the board are due, as stated in the report of the local board, to terminal charges or charges for one extra handling of the various commodities involved in the shipment by canal which is not involved in shipment by rail, to hostility of railways to waterways, and control of terminals and terminal charges by such railways. These extra charges against canal transportation and which, according to the findings of the local board make it not commercially feasible, are summarized in the report (sec. 89) as follows:

"(*a*) *Soft coal.*—Canal rate, 78 cents; unloading at St. Paul or Minneapolis, 25 cents; breakage in unloading, 25 cents; 50 per cent transferred to another yard, at least 10 cents; making same delivery that railroad makes, 25 cents; total, $1.63. Rail rate on soft coal, 90 cents. Loss, 73 cents per ton.

"(*b*) *Hard coal.*—Canal rate, 78 cents; unloading at St. Paul, 25 cents; delivery in St. Paul, 25 cents; total, $1.28. It will be noted that the anthracite coal is charged nothing for breakage or extra handling to another large yard. Rail rate on hard coal, $1.25. Loss, 3 cents per ton.

"(*c*) *Iron and steel.*—Canal rate, 78 cents; unloading in St. Paul (same as coal, which is more easily handled), 25 cents; delivery (same as for coal), 25 cents; total, $1.28. Storage in Duluth-Superior lost. Listed rail rate, $1.40 (actual much less). Gain, 12 cents per ton.

"(*d*) *General merchandise.*—Exactly the same throughout as iron and steel—$1.28. (Storage in Duluth-Superior lost.) Listed rail rate, $1.16 (actual much less). Loss, 12 cents per ton.

"(*e*) *Grain.*—Canal rate, 78 cents; elevator charges in Twin Cities, 27 cents per ton (three-fourths cent per bushel, average weight of grain shipped Duluth-Superior 55.6 pounds per bushel, or 36 bushels to the ton); elevator charges in Duluth-Superior (1 cent per bushel), 36 cents; total, $1.41 per ton. Railroad rate on grain, $1 for 90 per cent and 50 cents for 10 per cent, or an average of 95 cents. Assume that one-half the wheat passing through Minneapolis would pay elevator charges even if sent forward by rail, 13.5 cents; average elevator charges in Duluth-Superior, 36 cents; total, $1.445. Gain, 3.5 cents per ton.

"(*f*) *Flour.*—Canal rate, 78 cents; loading in Minneapolis, same as on cars; transferring in Duluth-Superior (same as wheat), 33 cents; total, $1.11. (Loss of free storage and advantage of stocking up in Duluth-Superior during winter for spring opening). Railroad rate, $1. Loss, 11 cents per ton."

POINTS AS TO WHICH LOCAL BOARD IS IN ERROR.

12. We respectfully suggest that the local board has perhaps unconsciously been led into certain errors, due, perhaps, to the acceptance of statements made by railway authorities and others interested in opposing the project as follows:

(*a*) In finding, or perhaps assuming, that the decadence of inland-waterway traffic is due to inherent or economic inferiority of water transportation as compared with railway transportation, and therefore that the inland canals, rivers, and waterways of the United States are of no economic value in transportation and are not worthy of improvement, and hence that it is a waste of public money to continue the policy of the United States Government of expending annually many millions of dollars in waterway improvements, and that such policy should be abandoned; also in assuming that the obstacles to successful waterway transportation due to railway hostility, unrestrained, cut-throat competition methods used by railways to destroy waterway traffic and amounting in effect to a boycott of such traffic hereinafter fully described, will continue in operation and either will not or can not be removed or prevented.

(*b*) In finding terminal charges and costs of handling of freight to be as stated in the report and that the same will continue as found therein and can not be reduced so as to amount to not more than 3 to 10 cents per ton. In finding 25 cents per ton deterioration of coal in one handling by clamshell instead of finding that such deterioration amounts to practically nothing, being fully offset by shaking in box car from Duluth to Twin Cities.

(*c*) In finding the average rail rates between Lake Superior and Twin Cities as low as $1.024 per ton, and especially the average rail rate on general merchandise. In assuming that existing rail rates will remain as low as at present and that railways will continue to be able to carry the rapidly increasing tonnage without congestion and consequent great public loss.

(*d*) In finding total bulk tonnage only 3,295,000 tons for the year 1912 and assuming that amount as the total tonnage available to the proposed canal when the true basis should be an estimate of the total tonnage available for the year 1920, or the date when the canal will be completed. This should be determined by reference to average rate of increase during the past years, shown to be at least 15 per cent per annum.

(*e*) In finding the Erie Canal average freight rate at 3 mills per ton-mile and in finding the average rate of proposed canal 3 mills per ton-mile by comparison with rates on the old Erie at a period when it had fallen into disuse through neglect and hostile railway control, when in fact the rate on the proposed canal should be found at not to exceed 1½ mills per ton-mile on bulk commodities and 2 mills per ton-mile on other freight.

(*f*) In finding that the proposed canal will not carry coal at any saving to the consumer, when in fact coal can be transported on the proposed canal at a saving of from 45 to 85 cents per ton, or a total saving at an average of 50 cents per ton on 2,000,000 tons of $1,000,000, or more than twice $420,000, the amount found necessary by the local board to make the canal commercially feasible.

(*g*) In finding that the canal will not carry any other commodities, such as iron, steel, cement, lime, salt, sugar, grain, flour, and general merchandise, when in fact such commodities can be transported via canal at an average saving of 42 cents per ton, or a saving upon general merchandise on 1,000,000

tons, $420,000; flour, 42 cents per ton, 1,000,000 tons, $420,000; north and east bound grain 42 cents per ton, 1,000,000 tons, $420,000 and a like saving upon limestone, building stone, brick, tile, commercial fertilizers, oil cake, potatoes, bran, shorts, grain, feed, hay, agricultural implements, pulp wood, etc., estimated 1,000,000 tons, at 42 cents per ton, $420,000.

(*h*) In finding the canal project not commercially feasible and not worthy of being undertaken by the General Government.

13. We will proceed to discuss the above proposition in the order stated.

CAUSES OF DECLINE OF INLAND WATERWAY AND CANAL TRAFFIC.

The leading authorities upon waterway transportation, including the Inland Waterways Commission, National Waterways Commission, Commissioner of Corporations, reports of committees of Congress, and writers upon the subject are unanimous in the finding that the decline of inland-waterway transportation has been caused and that the growth thereof is now prevented almost wholly by unregulated, unrestrained, and destructive railway competition. In the work of the destruction of waterway competition the railways have resorted to and still continue to use methods which are properly characterized as cutthroat methods of competition and destruction similar to the methods used by the Standard Oil Trust in past years and which seem to all fair-minded persons as unfair and immoral. In transmitting the preliminary report of the Inland Waterways Commission to Congress, Theodore Roosevelt, then President, said:

"The commission finds that it was unregulated railroad competition which prevented or destroyed the development of commerce on our inland waterways. The Mississippi, our greatest natural highway, is a case in point; one time the traffic upon it was without rival in any country. The report shows that commerce was driven from the Mississippi by the railroads. While production was limited, the railways, with their convenient terminals, gave quicker and more satisfactory service than the waterways. Later they prevented the restoration of river traffic by keeping down their rates along the river, recouping themselves by higher charges elsewhere. They also acquired water front and terminals to an extent which made water competition impossible. Throughout the country the railways have secured such control of canals and steamboat lines that to-day inland-waterway transportation is largely in their hands. This was natural and doubtless inevitable under the circumstances, but it should not be allowed to continue unless under careful Government regulation. Comparatively little inland freight is carried by boat which is not carried a part of its journey by rail also. As the report shows, the successful development and use of our interstate waterways will require intelligent regulation of the relations between rail and water traffic. When this is done the railways and waterways will assist instead of injuring each other. Both will benefit, but the chief benefit will accrue to the people in general through quicker and cheaper transportation. * * *

"The commission recognizes that the cost of improving our inland waterways will be large, but far less than would be required to relieve the congestion of traffic by railway extension. The benefits of such improvement will be large also and they will touch the daily life of our people at every point, uniting the interests of all the States and sections of our country."

Waterways Commission are found statements of river carriers, boats, and lines, and private canals owned or controlled by railroads. Most of the canals owned by the railroads are abandoned and the ownership by railroads shows why and through what influences they have been abandoned.

In the final report of the United States National Waterways Commission are found the following recommendations:

"Further legislation for protecting waterways against railway competition and for establishing more amicable relations between the two agencies of transportation."

On page 19 the commission says:

"The lack of adequate regulations makes it possible for the railways to effectually control or to crush out water competition through their ownership and control of boat lines. It is a well-known fact that the trunk-line railways through their control over terminals at Buffalo and their ownership of steamship companies on the Great Lakes, have been able to dominate lake-and-rail package freight business between New York and Chicago, and also to a con-

siderable extent the grain traffic. On the business thus controlled the water rates have risen, while on the coal, iron, and grain traffic, not controlled by the railroads, the water rates have constantly declined. * * * Independent companies have been unable to compete successfully owing to the advantage which their railroad-owned competitor enjoys. * * * Also on some rivers the railways have acquired control of packet lines.

"While this rapidly increasing control of railways over water lines tends to bring about that harmony of cooperation between them which is necessary for the development of transfer traffic, it also has possibilities of harmful results which require regulation. Where the railways grant prorating arrangements to boat lines which they own or control, while denying the same privilege to competing independent lines, the latter are practically precluded from securing any transfer traffic, while on the local or port-to-port business they must meet the competition of the railway-owned boat lines, which are at liberty on this business to cut rates to any extent they choose. Under such conditions it is very difficult for independent lines to succeed, and the cases are numerous where they have been forced to retire from the field.

"The situation calls for additional legislation, not only to prevent the elimination of water competition by this means, but also to protect the public against the raising of water rates which railway control over boat lines makes possible. Legislation to this end is as necessary for the preservation of water transportation as is the prohibition of rate cutting and other discriminatory practices. * * *

"The commission believes that the simplest and most effective means of securing these desired regulations is to give the Interstate Commerce Commission greater control over water lines, and accordingly recommends that every water carrier engaged in interstate commerce which is owned and controlled by a railroad, or in which a railroad is in any way interested, and also every independent water carrier which operates over a specified route with regular schedules, be placed under the control of the Interstate Commerce Commission and be made subject to the same rules and regulations now imposed upon railway corporations in so far as they are applicable. The commission should, however, be given broad discretionary power in enforcing the requirements of the law, particularly those relating to the filing and changing of rates, so that no unnecessary burdens will be imposed upon water transportation. The commission also recommends that the Interstate Commerce Commission be empowered to establish physical connection between the terminals of railways and boat lines where possible and desirable, and also to compel the charging of lower than the regular rates to river, lake, or seaports when the traffic is to be exchanged with water carriers.

"If water lines were made common carriers within the meaning of the law, the Interstate Commerce Commission would have power under the present statutes to establish through routes between rail and water lines and to require joint rates and through bills of lading. It would also have power to regulate the charges of water carriers and to require annual reports and other information by which to judge of the reasonableness of their charges."

On page 21 we find the following:

"The above-mentioned report on water terminals also shows that a large proportion of the most available water frontage is owned or controlled by railway corporations. Through this ownership or control they practically dominate the terminal situation at most of our ports, and they have generally exercised their control in a manner adverse to water traffic. In many cases they hold large tracts of undeveloped frontage which they refuse to sell or lease, and which are needed for the construction of public docks. This railway control of terminals is one of the most serious obstacles to the development of water transportation, for the control of the terminal means practically the control of the route. An independent boat line has small chance of success where it is denied the use of docks and terminal facilities or is required to pay unreasonable charges for their use. The high terminal charges at many of our ports make it impossible for small boat lines to enter at all.

"The commission believes that the proper solution of this terminal question is most vital to the future of water transportation. * * * The commission emphasizes the recommendation made in its preliminary report that further improvements in rivers and harbors be not made unless sufficient assurance is given that proper wharves, terminals, and other necessary adjuncts to navigation shall be furnished by municipal or private enterprise, and that the charges for their use shall be reasonable. It can not be too strongly urged that in many

cases it is not the condition of channels so much as it is the lack of terminals that is retarding the development of water transportation.

"Where water frontage necessary for the establishment of public terminals is held undeveloped by railway or other private interests, a special act of the legislature should be passed, empowering State or municipal officials to condemn such property for public use. This plan has already been followed in a few cases and should be more widely adopted."

14. In the chapter on canals in the United States, at page 188, preliminary report Inland Waterways Commission, it will be found that through purchases of stock, lease of canals, ownership of canal boats, discriminations against independent canal boats, discriminations against shippers using canals and other similar methods the railways were responsible for the decline of traffic upon or abandonment of most of the canals which have been abandoned or upon which traffic has declined. For instance, on page 259 it is said the principal reason why the Delaware & Raritan Canal is falling into disuse is the fact that the railway company (lessee) neglects to keep the canal in repair or to make necessary improvements to accommodate it to the needs of the present-day traffic, and to the further fact that it erected a number of bridges over the canal which are so low as to prevent the passage of steamers. The commission quotes with approval an opinion that the above canal, if put in condition and properly managed, could earn a dividend of 25 per cent on its capital. We quote from the same page as follows:

"The Bureau of Corporations is in possession of considerable evidence tending to show that the control of the Delaware & Raritan Canal by the Pennsylvania Railroad has been detrimental to interstate commerce."

Then follows a summary of the evidence.

The famous Morris Canal, extending from the Delaware River at Phillipsburg, N. J., through New Jersey to the Hudson River to Jersey City, a distance of 102 miles, completed in 1836 at a total cost of $6,000,000, was leased in perpetuity in 1871 to the Lehigh Valley Railway Co.

The Lehigh Canal in Pennsylvania, costing $4,455,000, leased to the New Jersey Central Railroad. And so practically all of the canals in the East, except the Erie Canal, have come under railroad control or influence, including the famous Chesapeake & Ohio Canal extending from Cumberland, Md., to Washington, D. C.

At page 316 of this report, speaking of methods of crushing out water competition on the rivers of the South, the commission said:

"Moreover, it appears that in some cases the steamboat lines are controlled by the railroad interests, while in other cases there is a division of the business which leaves the steamers only a fixed proportion of the low-grade freight. * * *

"In short, it appears that the railroads put in force rates so low as practically to drive the water lines out of business."

Speaking of the traffic on the Great Lakes the commission says:

"The advantages of the lake routes are further shown by the fact that all the important trunk lines of railroads control lines of vessels operating on the Great Lakes; this railroad control of lake lines reducing the effectiveness of the water competition on most freight except ore and coal and possibly lumber."

Speaking of coastwise traffic and influence of railroads thereon, the commission says:

"By these various water lines, freight rates on bulk commodities and also, to a large extent, on package freight, are so much below railroad rates that the rail lines can hardly be said to compete for a large part of the traffic. The influence of water competition is, however, reduced to some extent, as on the Lakes, by the control of several important coastwise lines by railroad interests, either through ownership of stock or in other ways. These and other coastwise lines are members of traffic associations in which railroad interests are also represented."

Speaking of river traffic in connection with railway control, on page 330 the commission says:

"A representative of one of the packet lines on the Ohio states that up to about 1900, when the United States Steel Corporation was formed, Pittsburgh boats had prorating arrangements with practically all the railroads tapping the Mississippi River, as well as the Ohio River, and reaching the South and West. At about the time mentioned, they received verbal notices from all these railroads through their commercial representatives terminating through rates.

Instead of being able to quote through rates as formerly the packet lines are now obliged to quote their own rate to the point where they connect with the railroad and then add the local tariff rate of the railroad from that point to destination. The railroads formerly issued joint tariff sheets with the packet lines just as they do with other roads.

"The reason assigned by such roads as the Louisville & Nashville and the Queen & Crescent for the termination of joint tariff relations was the pressure brought to bear upon them by the roads out of Pittsburgh.

"The loss of prorating arrangements has been a very serious matter to some of the packet lines. It has practically ruined the traffic in horseshoes, cotton ties, bar iron, wire nails, staples, etc., to the South and West, which was formerly extensive.

"A few years ago arrangements were in effect whereby shipments could be made from Pittsburgh territory and prorated via river and rail to Atlanta, Ga.; Chattanooga, Tenn.; Birmingham, Selma, and Montgomery, Ala.; Richmond and Roanoke, Va.; and Texas, Colorado, and California points; but the community of interest under which the railroads now seem to work caused the withdrawal of the prorating arrangements at almost all points on the Ohio and Mississippi rivers, thus compelling shippers to forward by all-rail lines instead of river and rail routes. Formerly shippers gladly availed themselves of prorating arrangements, particularly when there was a shortage of cars or congestion of freight."

Also on page 332, the following:

"Prior to the building of the division of the 'Frisco' Railway between St. Louis and Cape Girardeau, Mo., the Eagle Packet Co. had prorating arrangements on much through business by way of the latter point, but since the line was completed the railroad has discontinued the prorating arrangements and the packet company can get no other arrangements with railroads at St. Louis.

"The prorating between Arkansas River Packet Co. and the railroads was given up at the beginning of 1907. According to the packet company the railroads, after taking shipments of cotton for the East and for export would cause delivery to be delayed after they had loaded it on cars from the boat line, and would hurry their own shipments to attract business to the railroads. The boat line had to pay the same rate as other local shippers."

On pages 375–376 of that report will be found a list of water lines and private canals owned or controlled by railways.

With reference to the decline of water-borne traffic the National Waterways Commission, on page 68, says:

"The many advantages which a railway has in competition with a water route may be grouped into two general classes.

"1. Those inherent or fundamental advantages which are based upon permanent conditions.

"2. Those advantages pertaining to railways which may be deemed artificial or temporary. These are due to conditions not necessarily permanent in their nature."

Under the second head the commission refers to the right of the railway to charge lower rates between points where their line is in competition with water routes. The power of the railways to acquire steamboat lines or enter into agreements with them for the purpose of stifling water-borne traffic, either by operating the steamboat lines or by discontinuing their use upon competitive routes, the commission says, page 70:

"In both methods, namely, in the acquisition and operation of steamboat lines in such a manner as not to compete with railways, and in removing them entirely from the field of competition, the railway companies of the country have been very active.

"A third advantage arises from the refusal to prorate on through routes on which naturally freight would be carried part of the way by rail and part by water. In many cases the route, which apparently is the natural one, would be by water for three-fourths or more of the distance, yet the charge for the remaining railway haul is so considerable as to render carriage for the longer haul by water unprofitable.

"A fourth advantage of the railways, in this class, is the far greater attention given to provision for warehouses, terminals, and the equipment for handling freight. On many of the waterways very little, if any, progress has been made during the last 50 years in furnishing modern facilities for the storage or handling of traffic. In each of a considerable number of cities

located upon rivers and canals in Germany the members of the commission during their recent inspection trip saw a larger investment for terminals and for the storage of freight and handling of boats than exists on the whole Mississippi River above New Orleans."

The commission then refers to the fact that in localities where water-borne traffic has increased as on the Great Lakes careful and elaborate provision has been made for the handling of freight in the most economical manner. The reference to freight-handling facilities is intended to mean facilities for handling bulk freight, such as coal, iron ore, and grain. Further with reference to lake traffic, we quote from the commission (p. 71):

"Nothwithstanding the immense traffic on these lakes, it is, however, a noticeable fact that the quantity of general merchandise or package freight has not kept pace with the far more rapidly increasing traffic in the staple articles—iron ore, coal, grain, and lumber."

The reason for this will be shown later, and it is because such freight is controlled by railways who diverted it to railway lines.

On the subject of railway control of waterways, on page 515 of the final report of the National Waterways Commission, it is said:

"The indifference of local authorities to the development and control of their terminal facilities largely nullifies the benefits that might result from the appropriations by Federal Government for channel improvements, and the control which the railways have obtained over desirable water frontage has been very detrimental to the growth of water transportation. At Buffalo, Philadelphia, and other ports the railways often refuse the use of their docks to independent boat lines or allow such use only on condition that the freight unloaded on them shall be sent over their lines. Where they own boat lines, as on the Great Lakes and in the coastwise trade, their control over terminal facilities is a most important factor in eliminating the competition of independent lines."

And further, on the same subject, the commission, on page 533, says:

"An essential factor for the success of water transportation is the existence of amicable relations between the railways and waterways. A country may possess fine rivers, well improved, and may also have a large population and an abundance of coarse, bulky commodities, requiring transportation, but if the railways are allowed a free hand, they will divert most of the traffic from the waterways, even though the latter may afford cheaper transportation. In competing with waterways the railways have a distinct advantage. Only a small portion of their traffic is suited for water transportation. As a rule, little competition is possible on their passenger, express, and high-grade freight business. On the other hand, practically all the traffic of a waterway may be subject to rail competition. Furthermore, the railroad competes with water route only at comparatively few points, when the whole system is taken into consideration, while the water route is usually in competition with the railway at most all points. Under such conditions the rairoad can recoup itself for losses incurred by rate cutting on a few commodities and at a few points from the profits it makes on all the traffic not affected by water competition, while the water carrier, financially much weaker and having few, if any, way stations where it enjoys a monopoly of the business, has little opportunity to recoup itself anywhere. Thus the two never compete on equal terms and the relative cost of transportation, which should be the deciding factor, ordinarily makes little difference in the outcome of the contest. In the long run if the railway forces the competition the water carrier is almost certain to succumb. Only on large bodies of water has it any chance at all.

"A railway may also greatly limit the business of a waterway by preventing the exchange of traffic between the two. This can be accomplished by charging high local rates to and from transshipment points and by refusing to make prorating arrangements with water carriers and to establish suitable connections with terminals. In this way the inconvenience and cost of transferring freight is greatly increased. This method of competition becomes most prominent when the railway system is fairly complete and the different roads are working in harmony. As long as a waterway acts as a feeder for a railway, cooperation for the exchange of traffic will be manifest (p. 534).

"It may prove cheaper for a railway to control water carriers than to compete against them, especially when the natural advantages of the former are great. Thus it was the policy of railroads at one time to purchase outright or secure a controlling interest in competing canal companies. The common method in the

United States now is for the railways to own or control boat lines. Where they also own the terminal facilities at a port, it is a very easy matter to prevent serious competition from independents. The view was once held that the waterways were free highways on which competition would always exist, but what has transpired in the United States during the last decade indicates that even water transportation may be monopolized or so effectively controlled that it is hazardous for independent boat lines to enter the field.

"The experience of all countries has been that as long as the railways were not subject to strict control, they have succeeded in crushing out or controlling water competition. The regulation of railway activities for the protection of water carriers has, accordingly, been found necessary in all countries before the normal development of water transportation could take place."

And on page 538 the commission says:

"No serious attempt has yet been made in the United States to regulate the relations between the railways and waterways. The prevailing opinion at the time the interstate commerce act was passed in 1887 was that the waterways were the great regulators and cheapeners of railway rates, and for this reason should be hampered as little as possible by Federal regulation."

Later, on page 540, the commission refers to the amendment to the interstate commerce act of 1910 preventing railroads which have lowered rates to compete with water routes from increasing the same until after a hearing, that is, to prohibit railways from cutting rates for the purpose of driving out water competition and then raising them again, but it is said by the commission:

"It can not accomplish much for the reason that the common practice of railways now in competing with inland waterways is to keep their rates constantly at such a low figure that water transportation is not profitable. * * *

"The tendency in the United States as in England, has been to increase the power of the Government over water transportation. It was made necessary in England by the control which the railways had secured over the canal companies. In this country it has been due to the rapidly increasing control of railroads over boat lines, especially on the Great Lakes and in the coastwise trade. Where the railways and boat lines are operated under joint tariffs, the Interstate Commerce Commission has found it practically impossible to judge of the reasonableness of such rates without having a greater knowledge of the affairs of the connecting boat lines. Accordingly, since 1887 it has recommended on numerous occasions that the law be extended to apply to common carriers by water at least to the extent of giving them power to collect statistics and demand reports. * * *

"It is gradually coming to be realized in this country that the laissezfaire policy regarding water transportation is hardly more successful than when applied to other forms of business activity. The lack of proper regulation has materially aided the railways in crushing out or controlling water transportation and our rivers are no longer the cheapeners and regulators of railway rates that they once were. Even on the Great Lakes the railways have secured such control over the transportation of higher classes of freight between New York and Chicago that they have been able to raise the rates, while on traffic which they do not control the rates have continually declined. Also in the coastwise traffic the railways have secured such complete control that there is no longer any active competition. Independent companies can not successfully compete. This situation has led to proposals for securing additional legislation. A provision which has attracted a good deal of attention is contained in the so-called Panama bill. It makes it unlawful for any railroad company to own, lease, operate, control, or have any interest whatsoever in any common carrier by water with which it competes for traffic. A recommendation of somewhat different tenor is made by the National Waterways Commission in its final report. It proposes to extend the power of the Interstate Commerce Commission over all water carriers owned or controlled by the railways and also over all independent companies operating on regular schedules between specified points so that they may not be used in a manner prejudicial to the public good. The merits of these two propositions will be discussed in the last chapter. It may confidently be expected that in the near future legislation of some kind will be adopted."

Again, on page 555, the commission says:

"Almost all the package freight business on the Great Lakes is carried by railway-owned steamship lines operating in connection with the railways on through rates. Some of the independent companies also prorate with the railways on a small proportion of their business. * * *

"Where a boat line is owned by a railroad it is very difficult, as a rule, for independent companies to compete with it, inasmuch as the railway-owned boat line enjoying prorating arrangements generally has a monopoly of all the transfer traffic and is also able to compete on equal terms for the local, or port-to-port, traffic. There are many instances in the United States where independent companies not enjoying prorating arrangements with railways have been driven out of business. This has led to the proposal to clothe the Interstate Commerce Commission with greater powers over activities of water carriers, so that the advantage which a railway has by reason of its ownership of a boat line may not be used to eliminate water competition and to raise water rates."

15. As early as 1872 unfair competition by and discriminations of railways against water-borne traffic was recognized, as appears by the report of the Windom committee on transportation routes, found at page 582 of the preliminary report of inland waterways commission, which recommended:

"That all railway companies and freight organizations, receiving freights in one State to be delivered in another, and whose lines touch at any river or lake port, be prohibited from charging more to or from such port than for any greater distance on the same line. * * *

"The uniform testimony deduced from practical results in this country, and throughout the commercial world is, that water routes, when properly located, not only afford the cheapest and best known means of transportation for all heavy, bulky and cheap commodities, but that they are also the natural competitors, and most effective regulators of railway transportation. * * *

"The above facts and conclusions together with the remarkable physical adaptation of our country for cheap and ample water communications, point unerringly to the improvement of our great natural waterways, and their connection by canals, or by short freight railway portages under control of the Government, as the obvious and certain solution of the problem of cheap transportation."

16. The latest report dealing with the subject of railway monopoly and its control of waterway and canal traffic is the report of the Committee on the Merchant Marine of the House of Representatives dated March 5, 1914.

REPORT OF COMMITTEE ON MERCHANT MARINE.

The report of this committee was made after two years of thorough and exhaustive investigation covering the entire subject of water-borne traffic, foreign and domestic, together with the relation of railways thereto, including a study of the methods and results of railway competition and control. It finds in existence various combinations and consolidations practically controlling the entire field of water-borne commerce, foreign and domestic, including control of coastwise shipping water-borne traffic on inland rivers, waterways, canals, and the Great Lakes. It finds coastwise traffic is largely controlled by railways and shipping combinations; that inland water traffic on canals, rivers, waterways and the Great Lakes is almost wholly controlled and dominated by railways; that such railway control has been used for the purpose of destroying water traffic and waterway competition, including rivers, canals, waterways, and in part upon the Great Lakes, all to the great loss and detriment of the public because the higher cost and rates on all waterway traffic and the constant decline of the traffic on waterways and the increased freight movements on railways at higher rates. The report is an indictment against railway methods and railway control of waterways and water trnsporttion. The committee recommends legislation which would protect waterways from unfair, illegitimate, cutthroat railway competition and free water-borne commerce from railway control and domination, restoring to waterways their natural function of furnishing cheap transportation, especially for bulk freight. The report shows that the methods used by railways to destroy waterway competition are of the same general character formerly used by the Standard Oil monopoly to destroy its competitors and includes nearly every unfair method alleged to have been used by that monopoly.

We take the liberty of freely quoting from the findings and recommendations of the committee.

We believe the report demonstrates that the obstacles to the commercial feasibility of the proposed canal are almost wholly artificial; that they are largely the result of railroad hostility to waterways and unfair and improper railway discrimination and competition; that such obstacles are removable and preventable by proper Federal and State legislation and local action and that if the recommendations of the committee are adopted by Congress and

the States and localities interested in restoring waterway traffic, the result will be a great revival of water-borne commerce in the United States such as has taken place in Europe within the past generation. When the subject is understood by Congress and the States and localities interested, we think there is no doubt whatever but that ample remedial legislation and action will follow within a reasonable time. It is not logical or fair to assume that the United States Government will permit the hundreds of millions of dollars it has invested in the matter of waterways to be wasted for the lack of proper legislation, for want of which practically the entire investment of the United States Government in such waterways is now worse than wasted.

The following quotations are from Volume IV of the report of the committee:

METHODS BY WHICH RAILWAYS CONTROL WATERWAY COMPETITION.

"Competition in rates between domestic water lines, however, has been quite as effectively eliminated as in the foreign trade and this has been accomplished by the several lines through one or more of the numerous methods discussed in Part II of the foregoing report and summarized on pages 409 to 412" (p. 421).

"*Methods of control summarized.*—The numerous methods of controlling competition between water carriers in the domestic trade, referred to in the preceding pages, may be grouped under three headings, viz: (1) Control through the acquisition of water lines; or the ownership of accessories to the lines; (2) Control through agreements or understandings; and (3) Control through special practices. Briefly summarized, the various methods adopted for the control of competition are the following:

"I. Control through the acquisition of water lines or the ownership of accessories to the lines:

"(1) Direct railroad ownership and operation of water lines, the railroad's marine interests not being incorporated separately (pp. 377–390).

"(2) Railroad ownership through subsidiaries, or subsidiaries of subsidiaries, either rail or water (pp. 317, 318, 373–376).

"(3) Control by lease, especially in the case of canals (p. 408).

"(4) Ownership of boat lines by other boat lines, or by holding companies (pp. 352, 353, 378, 379, 383–386).

"(5) Joint control of a water line by several railroads (pp. 317, 318, 386–388).

"(6) Control of one water carrier over another, or of a railroad over a water line, indicated by one or more officers in common or by common representation on the board of directors (pp. 344–346, 350).

"(7) Control indicated by a community of interest through influential stockholders (pp. 344–346).

"(8) Railroad control of competing water lines or canals through the ownership or control of forwarding companies, thus diverting traffic to their own rail or water lines by refusing to exchange through freight with independent water lines. The latter are thus forced to depend upon local business, which is too limited to maintain the efficiency of the line (pp. 325–327).

"(9) Railroad or steamship company ownership of exclusive terminal facilities (pp. 323, 324, 327, 328).

"(10) Ownership or control of bulk carriers by producing and trading companies, which, while controlling a large portion of the traffic in a given commodity, also act as common carriers. These companies may also charter boats of independent lines, on such favorable terms as to induce such lines to observe a certain policy in the fixing and maintenance of rates (pp. 337, 338, 344, 345).

"II. Control through agreements or understandings:

"(11) Through agreements between water lines to divide the territory or charge certain rates. Unlike the practice in the foreign trade, such agreements are few in the domestic trade, the desired elimination of objectionable competition being effected through any one or more of the other methods (pp. 399, 400).

"(12) Through traffic associations, participated in by railroads and water lines, which publish tariffs but do not definitely bind the lines, i. e., there is no express agreement to observe the rates. While the water lines are emphatic in reporting that their affiliation with existing tariff associations or conferences is simply for the purpose of discussion and interchange of information and opinions on matters of mutual interest, and that their rights of separate and independent action are in no way restricted, the testimony shows that the rates and divisions of rates are determined at these conferences in such a

manner as to cause no discrimination against any of the members and to place the rate divisions for all lines via one gateway on the same basis (pp. 396, 397).

" (13) By requiring the unanimous consent of the existing members in certain traffic associations or conferences before admission can be secured by an outside line. Not to be granted membership in such associations places the outside line at the disadvantage of publishing tariffs at its own expense and of not being able to enjoy the same through rail-and-water rates as the conference lines (pp. 396–398).

" (14) Agreements or understandings not to charter or sell vessels to certain lines or for certain trades (pp. 392, 393).

" III. Control through special practices:

" (15) A railroad obtains control of a water line or canal and (1) fails to maintain the efficiency of the same, thus making water transportation so expensive as to eliminate competition, or (2) fixing rates so high as to preclude its use, or (3) abandons the property (p. 408).

" (16) A railroad charters space from a competing water line, although not using it, thus depriving shippers of space and making them dissatisfied with the water-line service (p. 360).

" (17) A railroad or its controlled water line or terminal company holds all the available docks and shedded piers and refuses access to an independent line for the purpose of discharging and receiving cargo, or allows access only upon payment of unreasonable charges. The independent line is thus required to unload at some other dock and team the goods to and from the railroad station (pp. 323, 324, 327, 328, 356).

" (18) A railroad or its controlled water line owns the available water frontage, which it refuses to utilize, at the same time refusing to release the same by sale or otherwise (pp. 323, 324).

"(19) A railway-water line or large all-water line cuts rates unduly (either by putting 'fighting ships' in the trade or by having its regular boats quote unremunerative rates) and when competition has been destroyed advances the rates even higher than they had been originally. While cutting rates the large company recoups itself out of rates at noncompetitive points or on through business secured from railroads on a favorable basis (pp. 385, 386, 393, 394, 407).

"(20) Railroads manipulate rates so as to make differential between their all-water, all-rail, and rail-water routes ineffectual as far as water transportation is concerned. The only inducement to use the water route is economy, and if the differential between the rail and water rates is made such as to just counterbalance the disadvantages of the water route the railroads will secure the business because, all things considered, their service is preferred (pp. 328–330).

"(21) Water lines make contracts with shippers whereby rebates or special rates are granted if the shipper transports his entire produce by a given line. Such contracts with important shippers greatly handicap independent lines in getting sufficient freight, especially if the contracting line spreads the report that the independent line will be allowed to remain in business only a short time. The important shippers, their business once obtained, can be held in line or disciplined (pp. 395, 396).

"(22) Large established water lines bring influence to bear on marine insurance underwriters whereby the independent line can secure only a less favorable rate, having due regard for the class of vessel, than its large and well-established competitors, thus forcing the independent carrier to equalize the extra cost of insurance in its rates to shippers to (p. 395).

"(23) Railroads or steamship combinations can allow competing lines a certain amount of freight with the implied knowledge on the part of the competing line that the railway or steamship combination possess the power to withdraw this allotted freight if the competing line shows aggressiveness or is unwilling to conform to the line of conduct desired. Often valuable season contracts are made with independent water lines, which these lines do not wish to lose by competing for freight (pp. 342, 344, 345).

"(24) Railroads may divert bulk traffic from watercourses by granting special commodity rates 'in transit' such as 'milling in transit' and 'compressing in transit' (p. 322).

"(25) Railroads can give access to docks to preferred water lines with which they have special arrangements, thus forcing shippers to other water lines to pay a series of charges for switching, docking, and unloading, and putting them to much inconvenience. In effect it means that the shipper who wishes the proper service must use the water line preferred by the railroad (pp. 334, 335, 399).

"(26) Railroads may refuse to issue through bills of lading except to favored lines, thus preventing independent lines from obtaining transfer traffic. To deprive an independent line of the advantage accruing from a joint rate arrangement with railroads places the line in a defenseless position as compared with competing lines not thus handicapped. Without such an arrangement the independent line can not secure interior freight and is limited largely to port-to-port traffic, which is too small in volume to support the line. On the other hand, the water line having the prorating arrangement can cut rates to an unremunerative basis on the port-to-port traffic, thereby eliminating its less fortunate competitor, and recoup its losses in large measure out of the profits secured on the through business (pp. 349, 350, 354–356, 400, 401).

"(27) Railroads charge more for the local haul from Buffalo to seaboard points, for example, on grain that is taken to Buffalo by boat than the proportionate share of the all-rail haul from Chicago to the seaboard, thus making the through rail-water route unprofitable as compared with the all-rail route. The local rate for the eastern rail haul is so high as to leave little to the independent water-carrier for its local lake haul (pp. 321–323).

"(28) Railroads can greatly reduce rates between these points only where they are competing with an independent water carrier. Since most of the traffic of a large railroad system is free from water competition, it can afford to lower the rates on the competitive traffic to an unremunerative basis without appreciably affecting the earnings of its entire system" (p. 407).

We quote from the findings as to specific instances of railway control of waterways and practices by which such control has been effected (p. 317):

"*Control of through-package freight business by railroad-owned boat lines.*—Enumeration of railroad-owned steamship lines: Although numerous independent steamship lines operate in the local port-to-port traffic on the Great Lakes, the through traffic from the western gateways on the Lakes, such as from Chicago and Duluth, to the eastern seaports via Buffalo, is controlled exclusively by six boat lines owned by the trunk line railroads connecting the East and Central West."

The report then enumerates the various lines of railway and gives by name and tonnage, etc., the boat lines controlled.

On page 319 we quote:

"Methods by which railroads owning standard lake lines have prevented independent water carriers from participating in the through-package freight traffic. Up to the time that the trunk railroad lines reached only to Buffalo, and had no interest in rail lines to the west of Buffalo, it was to their interest to maintain the lake lines in such a manner as to attract the largest amount of tonnage to Buffalo. But, with the extension of their rail lines to the west, their policy changed; and instead of attracting all possible tonnage to the lake lines connecting Buffalo and the west, every effort was made to divert waterborne traffic to their rail lines and to prevent independent water carriers from securing an important foothold. * * *

"So long as this class of freight originates on the railroads and is controlled by them, it is in their power to say to whom they will give it. They will not share it with any individual carrier that might offer, and they have thus controlled its movements. (Vol. 2, p. 842.) * * * Only boats owned by the railroads may engage in the package freight business between Chicago and Buffalo. If these two cities were both destination points for traffic, of course nonrailroad owned vessels could not be excluded from competition. But Buffalo is not a destination point. It is a transfer station. Goods reaching Buffalo by lake must go east by rail or canal. Likewise, freight from the east reaching Chicago water borne must be brought to Buffalo by rail or canal. The railroad makes with its own boat lines a through route and a joint rate from Chicago to the eastern destination, or vice versa. (Report of the Chicago Harbor Commission, 1909, p. 187.) In fact, all the testimony before the committee is to the effect that the through transportation of strictly package freight on the Lakes is completely under the control of the railroad-owned lines" (p. 320).

"Having become masters of the water-borne package freight business between Chicago or Duluth and Buffalo for transshipment to the seaboard, the railroads began the attempt in 1908 to secure control of the large grain movement to the east via the Lakes, a traffic handled largely by tramp steamers which seek to make their rates from port to port without reference to rail transportation. The policy of the railroads in this respect is to charge more for the local haul from Buffalo to the seaboard on grain that is taken to Buffalo by boat than the proportionate share of the all-rail haul from Chicago to the seaboard. The

effect of this policy is twofold, viz, (1) to divert the movement of grain from the Lakes to the railroads, and (2) to make the local rate between Buffalo and the eastern destination so high as to leave little to the independent water carrier for its local lake haul after paying the rate for the local rail haul" (p. 320).

On page 324 we quote:

"*Railroad control of the Erie Canal.*—In view of the railroad control of the standard through lake lines, as well as the lake haul eastward of Buffalo, it may be asked: Can not independent lake carriers utilize the Erie Canal route for shipments from the west to the seaboard? The answer is that this route is also completely dominated by the railroads as far as through traffic is concerned. Although at one time this waterway served as an important connecting link between the West and the East and exerted a powerful influence on rail rates, the railroads as early as 1878 sought to control this traffic, and since that time have lost no opportunity of diverting the canal traffic to their own lines by one method or another. Their control of the Erie Canal has become so effective that the carriage of through freight on the canal—i. e., freight originating outside of the State of New York—has, according to the findings of the New York Barge Canal Terminal Commission, 'almost reached the vanishing point.' Thus, during the year 1910, which is representative of recent years, the shipments of both through and way freight on the State canals of New York totaled only 3,473,412 tons, and of this only 805,180 tons represented through freight. In other words, the way freight—i. e., freight to or from points on the canals—was 3.31 times the through freight, thus showing that the Erie Canal has become relatively unimportant as a route for the carrying of freight between the Great Lakes and the Atlantic seaboard. (Report of the New York Barge Canal Terminal Commission, 1911, Vol. I, pp. 63, 64.)

"This declining importance of the canal is largely due, as already pointed out, to the efforts of the railroads to divert the traffic to their own lines, and the following factors may be briefly mentioned as indicating the methods which the railroads have pursued in accomplishing this purpose."

Here follows an enumeration of the railways which acquired various canal lines on the Erie and an explanation that the canal lines controlled by the railways are really railroad forwarding agencies which own no boats but solicit freight from shippers and charter canal boats from individual owners.

On page 326 we quote:

"The railroad forwarding agencies, enumerated above, together with a few independent canal lines, are members of the New York Canal Forwarders' Association. According to the report of the commissioner of corporations, the railroad agencies have also effected an association of their own known as the New York Canal & Lake Agents' Association, and this organization, together with the Association of Lake Lines (also dominated by the railroads), arranges and publishes the through rates via the canal as well as joint canal and lake rates.

"Having acquired all the through lake lines connecting Chicago and Duluth with Buffalo, and controlling the leading forwarding agencies on the canal, it was comparatively easy for the railroads to divert the canal traffic to their own rail or lake lines by refusing to exchange freight with independent canal lines or forwarders, except upon the payment of full local rates from Buffalo. As pointed out by the commissioner of corporations (report of Dec. 23, 1912, p. 59), 'the canal rate to Buffalo plus the rail rate, or the local lake rate, from Buffalo to the west makes the through rate so high as compared with the through rate of railroads, by their canal-lake-and-rail lines to western points, that the independent forwarding agencies virtually have no chance to do business.' In other words, the independent canal lines were prevented from having any lake connections, and were thus forced to depend upon local canal business, which was relatively small. Relative to this practice the New York Barge Canal Terminal Commission reports that (p. 327)—

"'Canal boats are greatly handicapped because of the lack of the through bills of lading so invariably used by the railroads and which, of themselves, so greatly facilitate shipments by the railroads. * * * Again, the railroads have always refused to either prorate or through rate with canal carriers, but on the contrary, have only been willing to receive freight brought to them by canal boats in the most unusual and expensive manner, such as by forcing them to discharge their freight at places other than the railroad wharves, and then team it to the railroad wharves, instead of allowing them to come direct to the railroad wharves and there discharge their freight. By refusing, on the other hand, to deliver freight to canal boats at their wharves,

they have been able to prevent them from carrying large quantities of freight that would otherwise have been shipped by the canals.' (Report of 1911, p. 78.)

"In connection with the foregoing factors should be mentioned the railroads' policy of acquiring the terminal facilities at both Buffalo and New York, thus forcing the independent canal lines to even abandon most of their local business. The effect of this railroad control of terminal facilities is explained at great length in the 1911 report of the New York Barge Canal Terminal Commission and is regarded by the commission as the greatest obstacle confronting transportation on the Erie Canal. Thus as regards Buffalo, with reference principally to the eastbound trade, and especially grain which is the chief item of eastbound through traffic, the report states:

"'The package freight business is wholly in the hands of the railroads, chiefly because of their terminal facilities and because the canals have hitherto possessed no terminal facilities whatever. Until facilities of an entirely independent character are established at Buffalo for transshipments, it is unlikely that there will be any considerable increase in through freight traffic upon the canals, however they may be enlarged short of avoiding the breaking of bulk at that city. * * * In the case of grain, there are but three or four 'independent' grain elevators. There being no wharves or other facilities at Buffalo reserved for the use of vessels bringing cargoes there from lake ports that might be carried on the canals, these boats are practically forced to lie up at privately owned—generally railroad-owned—wharves, thus facilitating the shipment of the freight by the railroads, since the latter refuse to afford any accommodation at their wharves for canal boats attempting to obtain cargoes for eastern carriage, as well as denying to all canal boats—other than those chartered by them—access to their wharves for the shipment of freight brought west.' (Report, 1911, pp. 77, 78.)

"Again with reference to New York City, report states:

"'There has never been any section of the improved water front in New York City, not even at the so-called canal basins, or canal districts, where there were any facilities other than the unshedded wharves for the accommodation of freight destined for shipment over the canals or for freight received from the canals. There has, even at such open wharves, been no one to receive and care for any freight that might be received either for shipment over the canals or that might be received at them by canal boats for local use. Lacking these essentials to the modern handling and carriage of freight, it was inevitable that the through business should have almost vanished.' (Report of 1911, p. 77.)

"*Effects of railroad control of through lake lines and canal forwarding agencies.*—Aside from the elimination of independent carriers, the effects of such control which have been most emphasized by witnesses before the committee are the increase in water rates on through package freight and the failure to improve the service. In the first place, lake-and-rail and canal-and-lake rates have shown a marked advance under railroad control, while the all-rail rates between Chicago and New York have remained about constant for the past two decades. Because of the slower speed and the larger number of transfers incident to water transportation, the lake-and-rail rates between Chicago and New York, for example, are lower than the all-rail rates between these points by an established difference, i. e., a differential which measures approximately the difference between the value of the water service and the rail service. The present differentials between the two services may be illustrated for the several classes of freight as follows:

	Class 1.	Class 2.	Class 3.	Class 4.	Class 5.	Class 6.
WESTBOUND.						
New York to Chicago:	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
All rail	75	65	50	35	30	25
Rail and lake	62	54	41	30	25	21
Differential	13	11	9	5	5	4
EASTBOUND.						
Chicago to New York:						
All rail	75	65	50	35	30	25
Rail and lake	63	55	43	30	26	21
Differential	12	10	7	5	4	4

"The above differentials are merely illustrative of the plan in general; various differentials have been adopted as between different routes and different cities. But what should be particularly noted is that the differentials between the all-rail and the lake-and-rail rates have in all cases been narrowed, thus causing an increase solely in the rates for the lake haul, since the all-rail rates have remained constant. While the standard lake-and-rail rates between New York and Chicago, for example, were—

	Cents.		Cents.
Class 1	54	Class 4	27
Class 2	47	Class 5	23
Class 3	37	Class 6	20

prior to 1901, these were increased in 1901 from 54 to 59 cents on first-class freight, and other classes to correspond. In 1907 there was another advance to 62 cents on first-class freight, and other classes to correspond. Similarly canal-and-lake rates from New York to Chicago have also advanced since 1892, as follows:

	Class 1.	Class 2.	Class 3.	Class 4.	Class 5.	Class 6.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
In 1892	30	25	20	18	16	14
At present	42	36	29	23	21	18

"These increases in the through water rates, while the all-rail rates have remained nominally constant, have, it was argued by the witnesses before the committee, made the differential between the lake-and-rail and all-rail rates so small that the freight will move by rail. The inducement to use the water route, it is argued, is economy; and if the differential between the two rates just measures the disadvantages of the water route, the railroads will get the business, because, all things considered, the railroad service is preferred. Under such conditions, it is argued, the value of the water line as a regulator of rail rates disappears. Mr. William M. Hopkins in his testimony emphasized the point that the reduction of the difference between the all-rail and the lake-and-rail first-class rate between 1901 and 1913 from 21 to 13 cents, and correspondingly on other classes, has been brought about, not by a reduction of the all-rail rate, but by an advance wholly on the lake transportation portion of the through rate. (Vol. 2, p. 1225).

"Mr. Julius H. Barnes, of Duluth, emphasized the same point in his testimony, stating that whereas 'in 1890 the lake-and-rail rate on flour from Minneapolis to New York was 20 cents and the rail rate 25 cents, and all flour moved lake-and-rail, they have since advanced the lake rate until the difference to-day is between 23 and 25, instead of 20 and 25, and that is just the dividing line where they are giving just enough to the Lakes to make a bluff at water transportation. If it was necessary, they would raise it to 24 as against 25, and they can do that, in my judgment.' (Vol. 2, p. 843.)

"To the foregoing it may be added, as already indicated, that the lake lines have arrangements for through routing and division of rates with the railroad lines, as shown in tariffs filed with the Interstate Commerce Commission, and the division received by the railroads for their haul east of Buffalo on traffic moving via the lake-and-rail route are substantially the same as the divisions they receive for the same haul on similar traffic moving via all-rail routes.

"Not only has freight destined to the East been diverted from the Lakes through the narrowing of the differential between the lake-and-rail and all-rail rates, but the railroads have had no incentive to improve their water-line service, their policy in this respect being entirely different from that pursued by the bulk carriers. Mr. Barnes testified that—

"'Package freight lines are loading and unloading merchandise on the Lakes the same to-day as they did 40 years ago. Absolutely nothing has been done in the way of installing mechanical devices to cheapen the transshipping of package freight. It has been to the interest of the railroads to maintain the old-fashioned gangway style of steamers, in which freight must be taken on and off over the side of the boat on trucks. The small derrick arranged for some classes of freight, such as flour and mill stuffs, which would lift the freight directly from the cargo hold out on the docks, would cheapen the trans-

shipping charge, but as long as it originates on the railroads and is controlled by them, it is in their power to say to whom they will give it and they will not share it with any individual carrier that might offer.' (Vol. 2, pp. 841–842.)"

On page 336 we quote:

"The situation as outlined for the movement of package freight does not apply in the case of bulk products such as grain, iron ore, and coal, except that in the case of grain the rail carriers, as already pointed out, do exercise a large measure of control over the rates of water transportation by reason of their control of the terminal facilities and the connecting rail transportation beyond the Lakes. In the main this bulk freight is handled by so-called independent tramp steamers whose port-to-port rates are fixed without reference to rail transportation. As a result conditions in this field have shown a tendency decidedly favorable to the utilization of America's leading waterway as a chief means of transportation; in fact, the entire development in the bulk traffic has been the exact opposite of the tendencies noted in connection with the movement of package freight by railroad-owned boat lines. This class of freight traffic has had the advantage not only of an improved type of steamer of large carrying capacity, but improved machinery has been installed at both ends of the trip for the expeditious handling of iron ore and coal at a cost of only a few cents a ton (vol. 2, p. 844), thus greatly reducing the cost of loading and unloading and saving the boats much time."

On page 337 we quote:

"Despite the favorable tendencies noted in the preceding section, it should be stated that there has been a marked tendency during recent years toward consolidations among bulk carriers transporting ore and grain eastbound, and coal westbound on the Lakes. The eight largest of these consolidations deserve special mention, and the essential facts with reference to each, as reported to the committee by the managements of the companies involved, are herewith presented."

On pages 403, 404, and 405 is given a summary of the railway control and ownership of the coastwise and Great Lakes shipping, and on page 406 we quote with reference to the situation on inland rivers, bays, and canals:

"Much the same situation as was noted in the coastwise and Great Lakes trade also exists on inland rivers, bays, and canals. Despite the continued improvement of waterway and the great increase of traffic in the coastwise and Great Lakes trade, 'the total river traffic of the country has steadily decreased both proportionately and absolutely, with the result that few rivers are used to anything approaching their full capacity.' While, generally speaking, the decline of navigation lines on inland waterways is largely traceable to the natural extension and legitimate competition of the railroads, there is ample evidence to show that the railroads have successfully opposed the maintenance and development of river and canal traffic by a variety of effective methods, mainly by acquiring competitive water lines and canals, by obtaining control of the terminal facilities, by the use of rebates, or by the undercutting of rates. Aside from the acquisition of competing lines, the undercutting of rates seems to have been the favorite method adopted by railroads to eliminate water competitors. Since the railroads reach all sections of the interior, and the inland navigation lines are restricted to their water course, they can easily control so large a proportion of the total freight as to leave the water lines insufficient freight to maintain proper terminals and an efficient service. As reported by the Inland Waterways Commission:

"'So large a portion of railway traffic is free from water competition that railways can readily afford to so reduce rates on those portions affected by such competition as to destroy the profits of the water lines without appreciably affecting the profits of the rail system, which recoup there reductions by higher rates elsewhere. This has been the case with most of the great inland waterways, excepting the Great Lakes, where the conditions of water and traffic approach those of the open sea.'

"This method of eliminating water competition is well illustrated by the experience of water lines on the Mississippi River system. On this system packet line services have largely disappeared, owing to railroad competition, and the few lines remaining, while generally independent of railroad control, are but weak competitors. Effective railroad opposition to independent water lines also exists on the Nation's other leading rivers, such as the Columbia and Hudson.

"Most of the canals of the country have also long since passed into the hands of competing railroads. Almost invariably, following the acquisition of the

canals, the railroads failed to maintain the efficiency of the same for transportation purposes or raised the tolls so high as to preclude their use, or entirely abandoned the property. In some instances, however, the decrease or practical disappearance of canal traffic is traceable to the antiquated character of the canal, and in all likelihood most of the privately owned canals would by this time have ceased to be an efficient means of transportation, even though they had not been acquired or controlled by the railroads. Even the most important State canal—the Erie Canal—as already shown, is so completely dominated by the railroads, as far as through traffic is concerned, that the movement of freight originating outside of the State of New York via this route has almost reached the vanishing point. Not only do the railroads own all the through Lake freight lines centering at Buffalo, but they control practically all the terminal facilities at both ends of the canal as well as the forwarding agencies and boat owners. At present about 90 per cent of the mileage of the private canals still in operation is under railroad control."

RECOMMENDATIONS OF THE COMMITTEE.

The committee, after referring to the extent to which waterway competition has been eliminated (p. 415), say:

"The act of August 24, 1912, providing for the opening, maintenance, protection, and operation of the Panama Canal, contains provisions extending the jurisdiction of the Interstate Commerce Commission over the interstate transportation which involves the carriage of property by rail and water, in the following particulars, viz, (1) to establish physical connection, where this is reasonably practicable and justifiable, between the rail carrier and the dock of the water carried by directing either or both of the carriers to construct the connecting tracks; (2) 'to establish through routes and maximum joint rates over such rail and water lines, and to determine all the terms and conditions under which such lines shall be operated in the handling of the traffic embraced'; and (3) 'to establish maximum proportional rates by rail to and from the ports to which the traffic is brought, or from which it is taken by the water carrier, and to determine what traffic and in connection with what vessels and upon what terms and conditions such rates will apply.' Section 11 of the act also provides for the divorcing of common carriers by water from the railroads under certain conditions. These legislative requirements go far toward eliminating some of the undesirable practices which were found by the committee to exist in the domestic commerce of the United States. The committee, however, believes, in view of the facts presented in Part II of the report, that additional legislation is required, and wishes to offer the following recommendations:

"(1) That the jurisdiction of the Interstate Commerce Commission be extended to the interstate port-to-port traffic of domestic water carriers, with full power to require all such carriers to file their port-to-port rates and to submit reports of their financial and business operations. As regards interstate port-to-port traffic the commission should be given full power to regulate rates and to determine maximum charges.

"(2) That water carriers be required to file for approval with the Interstate Commerce Commission all agreements affecting interstate transportation, whether written or oral, and all modifications or cancellations thereof, with other water carriers, with railroads or other transportation agencies, or with shippers.

"(3) That the carriers be prohibited from granting rebates of any kind to shippers and from discriminating between shippers in rates, in the giving of space accommodations and other facilities, and in the making of unfair contracts based on the volume of freight offered. Water carriers should also be prohibited from using fighting ships, or deferred rebates, or from threatening or resorting to retaliatory or other unfair measures against shippers or competitors. The Interstate Commerce Commission should be empowered to adopt whatever measures it may consider necessary to protect shippers or competitors against such retaliatory methods. Water carriers, if cutting rates with a view to driving out a competitor, should be denied the privilege of restoring rates; and jurisdiction should be conferred on the Interstate Commerce Commission to determine whether rates were cut with the object of crushing such competitor.

"(4) That the Interstate Commerce Commission be empowered to investigate fully all complaints charging unfairness in the settlement of claims, and in-

difference to the loading and landing of freight in proper condition; and to adopt all necessary rules and regulations for the adjustment and settlement of claims.

"(5) That as regards all matters relating to interstate transportation, all traffic associations or conferences, whether pertaining to through rail-and-water transportation or to port-to-port traffic only, be brought under the supervision of the Interstate Commerce Commission. The committee recommends that the conditions under which an outside water carrier is admitted to such associations or conferences should be approved by the commission, and that an outside line should not be denied membership for unfair reasons or simply because the unanimous consent of existing members of the association or conference to the admission of said line can not be obtained.

"(6) That the railroads be prohibited from making the through rail-and-water route unprofitable as compared with the all-rail route by charging more for the same service on water-borne commodities than they charge for the proportionate share of the all-rail haul.

"(7) That the Interstate Commerce Commission be empowered to compel railroads to allow competitive water carriers to apply effective differentials. The commission should also have full supervisory power over divisions between railroads and water carriers as regards through rail-and-water rates. The committee recommends that rate divisions on any trade route should be opened equally to all water carriers that comply with such conditions of quality and regularity of service as the commission may determine to be reasonable.

"(8) That the railroads and water carriers be required to issue through bills of lading to all interstate water carriers that meet such conditions of quality and regularity of service as the Interstate Commerce Commission may consider reasonable.

"(9) That railroads be required to account separately to the Interstate Commerce Commisssion for the income and expenditures of interstate water lines owned or controlled by them.

"(10) That railroads be required to make their terminal facilities available to water carriers on equal terms and under such reasonable conditions as the Interstate Commerce Commission may prescribe. The committee also believes that the Federal Government should pursue a policy of not expending money in the interests of any port for harbor or channel improvements unless that port has efficient dock facilities available to all water carriers.

"(11) That there should be legislation providing for equal treatment to all shippers and water carriers by transfer and lighterage concerns when forming a link in interstate or foreign commerce.

"(12) That all interstate traffic on canals be placed under the supervision of the Interstate Commerce Commission, and that the railroads be prohibited in the future from acquiring, either directly or indirectly, ownership and control of or interest in canals, or water lines, forwarding companies, and other navigation facilities on such canals when the same are used in interstate transportation."

18. From the foregoing it seems to be perfectly clear that the railroads have succeeded to a very large extent in monopolizing transportation not only upon the railways but upon the waterways and canals to such an extent that they control through freight rates by water, leaving to independent carriers only that small fraction of the entire traffic to be had in port-to-port traffic even as to which the independent water carrier is entirely at the mercy of its railway-controlled competitor who has the great advantage of traffic with railways, prorating arrangements, etc., on the profit of which the railway-controlled carrier can exist and carry port-to-port traffic at any rates fixed by the railway-controlled water carrier. The control of terminals, warehouses, docks, loading and unloading facilities, etc., enables the railway combination owning and controlling railway terminals, and lake and water carriers to offer advantages in the way of free storage or rates which include or absorb terminal and handling charges and transfers from rail to boat and boat to rail at such a decided advantage that under present conditions the independent canal boat or water carrier can not exist except at the pleasure of the railway combination or monopoly. The question is, Must it be assumed that the foregoing conditions are uncontrollable and that such conditions are to indefinitely continue? Should it not be assumed that the evils of unrestrained railway competition resulting in monopoly of transportation by water and rail and enormous losses annually to the consuming public can and will be reached by legislation and by other orderly and legal methods?

Must it not be assumed that public opinion aroused by the several reports of congressional bodies and other authority upon the subject will in thunderous tone voice a demand which will be so powerful as to result in the needed legislation being promptly enacted?

19. So far as local legislation is concerned, with reference to placing ownership and control of terminals in the public authorities of the States of Minnesota and Wisconsin, and providing for the use of the proposed canal adequate terminals equipped with the most modern terminal facilities, we have no hesitation in pledging that the same would be provided by the localities interested in the promotion of this enterprise and if upon a review of the report of the local board the existence of hostile railway control or want of adequate terminals and terminal facilities without discrimination were deemed to be material to the success of the canal the proponents of the canal would welcome the conditional approval of the general board, i. e., conditioned upon the removal of the adverse conditions found to exist with reference to hostile railway monopoly and absence of terminals and terminal facilities.

HISTORY OF HOSTILE RAILWAY COMPETITION.

The local board of engineers make the claim that current history shows that unless there is sufficient tonnage available to be transported by the canal at the present time such tonnage will not increase but on the contrary will decrease. It is partly in this connection that the local board cites the decline of traffic on the Ohio River, Mississippi River, Erie Canal, etc.

We are glad to invoke the authority of history with reference to the causes of the decline in the water-borne traffic in the United States. The history of waterway transportation is much the same whether we examine the history of waterways in Europe or in the United States. We believe a study of the history of waterway transportation in Europe and in America will convince the unbiased reader that the history of waterways in Europe is now being duplicated in the United States; that the rise and decline of waterway transportation in the United States was caused by identically the same factors which caused the former decline of waterways in Europe. We think the same causes that contributed to the resurrection and rehabilitation of waterways in Europe are now at work in America and will cause a like development of waterway traffic in the United States, and that there is now commencing in the United States a great revival of waterway transportation similar to that which is so plainly in evidence in Europe.

Authorities on the history of inland water transportation divide its history into three periods (see p. 471 et. seq. Final Report National Waterways Commission):

First. The period which began with the sixteenth century in Europe and shortly after the close of the Revolutionary War in America, and extended to the time of commencement of railroad building.

Second. The period of active competition with railroads resulting in decline and decadence of waterways.

Third. The period which began in France, Germany, and Belgium as early as 1870 and which is characterized by the great revival of water transportation.

The first period was essentially one of canal building and commenced in Europe in the seventeenth century. Practically all of the canals of France, Holland, and Belgium were completed before the year 1800.

In England active canal building began with the opening of the Bridgewater Canal in 1761. This enterprise was a great success and created a boom for canal construction. By the year 1800 practically the whole of the English canal system, aggregating more than a thousand miles, was completed. A few additions were made between 1800 and 1830, but since 1830 no important canals have been constructed except the Manchester Canal.

Canal building in the United States began a short time after the close of the Revolutionary War. Washington was one of the pioneers in the movement. The most rapid construction commenced about 1825 when the Erie Canal was completed. It was a great success and aroused great enthusiasm for canal building. Most of the canals of New York, Ohio, Pennsylvania, New Jersey, and other eastern States were completed before 1850.

Canals constructed in Europe during the first period were usually of small capacity. The majority of English canals had a depth of only $3\frac{1}{2}$ feet; 35 per cent of the total canal mileage of England would only accommodate boats

carrying from 18 to 30 tons, 58 per cent of boats carrying from 40 to 60 tons, and only 7 per cent would accommodate boats of greater capacity.

The early canals in the United States were also shallow draft and equipped with numerous locks and sometimes incline planes. The Morris Canal was originally only 4 feet in depth and accommodated boats of less than 40 tons capacity.

Although the canals of the first period as a rule were scarcely more than ditches many of them were very profitable enterprises. Until railroad competition began they furnished the principal means of transportation and played a very important rôle in the prosperity and development of different countries. They appear to have been more profitable in England than elsewhere, their profits being greater than those of the railways have ever been. Many of the canals in the United States were exceedingly profitable. The Schuylkill navigation during the period of 1829–1842 paid dividends ranging from 9 to 24 per cent. The Erie Canal up to and including 1882 had returned to the State of New York $42,599,718 profits on an investment of $49,591,853. Other eastern canals were highly profitable.

The period of railroad building commenced about 1830. Within 10 years in Europe competition between railways and waterways became severe. This continued for the next 30 or 40 years, at the end of which time the waterways were generally left in a decadent condition. At first the railroads often intersected the waterways and served as feeders. As soon as parallel lines were built active competition began. Passenger traffic was the first to drop off, then higher grade freight, and finally, when the railroads had consolidated sufficiently to form through routes so as to serve a large territory in addition to that adjacent to the banks of the canal, they offered cheaper rates and secured most of the coarse, bulky traffic carried by the waterways. One great weakness of the canal system was that they were owned and controlled by various private companies in short sections and they failed to amalgamate or consolidate so as to unite their strength and furnish facilities for through traffic. The railways uniformly adopted the policy of consolidation and amalgamation, thus extending their territory and ability to handle through traffic, at the same time gaining the advantage naturally accruing to large combinations.

In England, when the shareholders of canals saw their profits dwindling, they procured the consent of Parliament for the purchase of various canals by the railways, and within five years after active competition commenced, about 1845, one-third of the total canal mileage fell into the hands of the railway companies. Part of the canals so acquired were used as roadbeds for new railway lines or abandoned; others were used for feeders, and almost all of the traffic declined rapidly as the result of railroad control or competition.

Railway competition in the United States commenced in 1842 between the Reading Railroad and the Schuylkill navigation. It was severe until 1849, when the railroad and canal entered into an agreement as to charges, and in 1879 the canal was leased to the railroad for 999 years. The history of the Schuylkill navigation was repeated with the Lehigh Canal, which was sold to the Lehigh Valley Railroad, and in a few years practically all of the private canal companies in New York, Pennsylvania, and New Jersey passed into the hands of their railway competitors. New York and Ohio retain their publicly owned canals. As we have heretofore seen, the leasing or selling of a canal to a railroad meant its practical and ultimate abandonment.

In the Mississippi Valley and the South severe competition between railways and waterways did not begin until after the Civil War, when the short railway lines were amalgamated into through routes. The improvement of rivers by Federal Government enabled waterways to compete successfully for a time, but the commerce of the Mississippi River reached its maximum from 1880 to 1884, since which time there has been a considerable decline. Some of the western rivers have not experienced railway competition and their traffic has steadily increased. Wherever railway competition has been encountered almost without exception a marked decline in river and canal commerce has ensued. In Europe, including England, interest began to be aroused in water transportation in the sixties and seventies. This was due to the same causes now operating in this country, viz, a growing hostility toward railroads brought about by discriminations, high rates, lack of service, and congestion of traffic. The result of the agitation in Europe has been a practical nationalization of waterways in France, Germany, Belgium, and Holland, which countries have acquired practically all of the canals and waterways. The first step in the

revival of water transportation in Europe was the standardization of canals and waterways as to depths, locks, etc., the old methods of towage by mule or other power being supplanted by steamers or electric tractors. Terminals were built and equipped with the latest appliances and better types of boats and barges are being used.

Growth of water transportation in Germany, France, and Belgium during the last 40 years has been phenomenal; from 1875 to 1909 traffic on the German waterways increased 433 per cent; from 1880 to 1909 traffic on the French waterways increased over 90 per cent; and in Belgium during the years 1890–1907 the traffic on inland waterways increased 115 per cent. The following table shows the growth of traffic in these three countries:

Year.	Germany.	France.	Belgium.
	Tons.	*Tons.*	*Tons.*
1875	13,600,000	.....	.....
1880	.....	18,000,000	.....
1890	.....	24,167,000	25,242,000
1895	30,000,000	27,174,000	30,142,000
1900	46,600,000	32,446,000	38,178,000
1905	67,000,000	34,030,000	53,345,000
1907	.....	34,702,000	54,164,000
1909	73,357,000	35,624,000	.....

Russia reports 100 per cent increase in the last 10 years.

In Germany, at several of the largest inland cities, the receipts and shipments by water nearly equal those by rail. Since 1885 the waterways centering at Berlin carried from 40 to 50 per cent of the total receipts and shipments; at Hamburg the receipts by river are nearly equal to those by rail.

England is the only one of the more advanced European countries in which inland waterway transportation is still in a backward condition. The canals there were originally built by private interests and are still under private control. The different canals still remain disconnected and under a multiplicity of authority split up into short sections owned by different companies or persons. Very few waterways have been enlarged or improved to meet modern conditions; almost all through routes are blocked by railroad control by one or more important links. Not one of the 19 different through routes in England and Wales is controlled by a single body. On three routes connecting London and Liverpool there are 26 different authorities. On the four routes between London and Bristol there are 27 different authorities. On the route between Holland-Bristol the boat must traverse 10 different routes with gauges varying from 50 by 14 by 4.6 feet to 212 by 22 by 9.6 feet. Since 1870 there has been a gradual revival of interest in waterways in England which has led to considerable agitation, parliamentary inquiries, and some legislation having for its purpose the protection of canals and waterways from unreasonable, unrestrained, and unfair competition, ownership, and control, but up to the present time, owing to the opposition of railways in England, there have been no considerable results in the revival of water transportation.

The history of waterways in the United States is a duplication of continental European history of the same subject up to the year 1870. Canal and waterway transportation in Europe were destroyed by railway interests by practically the same means employed here, as shown in the foregoing reports, and with the same results. Waterway transportation in Europe was revived by Government protection of waterways from the hostility and competition of railways. It will be necessary to employ the same means in the United States to bring about the same result shown to have followed from the governmental policy in Europe. There has been a growing agitation for improvement of waterways in the United States for 12 or 15 years past. This has been especially prominent since the congestion of traffic which occurred in 1906–7, when the railway failed to furnish sufficient accommodations to take care of the enormous traffic. The agitation in this country, as in Europe, is based upon the fundamental and economic necessity of cheaper and more adequate transportation facilities. The United States possesses better natural waterways than any country in the world and it is evident that natural conditions have not been responsible for the decline of water-borne traffic in this country. It is conceded and is apparent from the reports hereinbefore cited that railway competition has been more

severe here than in any of the countries of Europe. The methods used by railways to strangle waterways have been and are more vicious and crippling in character than any known in the history of continental Europe. So far as any argument with reference to the future of waterways in the United States can be based upon the history of waterways in general, it would seem to be almost conclusively apparent that the waterways of the United States, if freed from the artificial conditions created and fostered by hostile railway interests and adequately protected by the Government from destructive railway competition, would be revived and restored and would carry a large percentage of the bulky freight of this country naturally tributary to such waterways. If proper protective conditions were supplied by governmental action and legislation, supplemented by proper terminal facilities, physical connection between railway and waterway, etc., no reason can be advanced why the waterways of the United States should not compare very favorably in increase of traffic with the waterways of Europe.

It appears from the history of European waterways that Germany has the best and most efficient waterway system of any known in the world. This is shown by the great increase of traffic during the last 40 years, which period marks the industrial rise of Germany from a comparatively insignificant nation commercially to the foremost place among the nations of the world. She is now England's greatest European rival for commercial supremacy. It appears that freight can be transported from the interior of Germany and landed on the dock at London as cheap as the same freight can be transported from points inland in England distant 50 miles from London. (Final Report National Waterways Commission, p. 490.) Leading economists and authorities on commerce attribute Germany's rapid commercial advancement to her magnificent system of inland waterways, while England's comparative commercial decadence is likewise attributed to the utter failure of her inland waterway system. It is well known that railway rates in England are higher than in any other country in the world. The average capitalization of her railway lines is also the highest of any in the world, being an average of $275,000 per mile.

While it may be claimed that conditions in Europe are more favorable to waterway transportation than in the United States on account of the greater density of population and the enormous quantity of bulk commodities such as coal, iron ore, grain, cement, etc., available there, yet the great success of revived waterway transportation in Europe is material to this discussion because such history clearly shows the necessity of the protection of waterway transportation even under the most favorable conditions from unrestrained, unregulated railway competition and because it is further shown that the conditions necessary to the favorable development of water transportation in Europe and elsewhere exists with reference to the proposed canal from Lake Superior to the Mississippi, to wit, the existence of a large amount of available bulk tonnage such as coal, iron ore, stone, cement, steel and iron, general merchandise, wheat, coarse grain, flour, and other like commodities, together with a large population at the terminii and adjacent to the waterway for the consumption and manufacture and use of such commodities, in addition to the fact that the canal will form a link between the great waterway transportation systems from the Atlantic seaboard via Erie Canal, Great Lakes, Mississippi River, Gulf of Mexico, and Panama Canal.

TONNAGE ADDITIONAL TO LOCAL RAIL TRAFFIC OF 1912.

21. The engineers in their report, as above, considered only estimated actual local rail traffic between principal terminals for the fiscal year 1912 as the basis for the volume of tonnage which the canal would handle.

To this, it is obvious, there are vital and important additions to be made, including tonnage allowances to meet the following conditions:

(*a*) Volume of annual traffic growth of canal zone, including Duluth-Superior Harbor and upper Mississippi ports, from 1912, when engineers took local rail traffic data to date when canal shall be completed and in operation—say, 1918—period of six years.

(*b*) Volume of traffic developed by canal itself in canal zone, through effect of 250 additional miles of transportation facilities afforded, (1) to hitherto undeveloped resources, (2) to commerce of existing lake and river terminals (3) to existing manufacturing and agricultural industries, (4) to creation of new industries, (5) to creation of new commerce between local points, (6) to

stimulus of lower and equalized transportation rates, (7) to cooperation between waterways and railways in developing tributary territory.

(*c*) Volume of new tonnage created by opening a through channel of commerce between the Government upper Mississippi River project of navigation and Great Lakes navigation, thereby opening up navigable route for new commerce between North and South, Lakes and Gulf, Panama Canal and Great Lakes, and between the upper Mississippi Valley and eastern ports via the Erie and Welland Canals.

(*d*) Volume of increased farm and mill tonnage in 28 tributary Wisconsin and Minnesota counties located partly within canal zone and partly on two sides of channel of connecting upper Mississippi navigation project, being the river counties of these two States, the United States census value of whose farms increased from $240,000,000 in 1900 to $456,000,000 in 1910—an increase of $216,000,000, or 90 per cent, in 10 years—and subject to further immediate increase in value and tonnage upon development of their chief route of water transportation. These 28 counties in 1910 produced 62,000,000 bushels of grain, dairy output of 464,000 farm cows, 616,000 bushels of fruit, 1,878,000 tons of hay, and 13,000,000 bushels of potatoes, which will increase 50 per cent by 1918. (See Exhibit 1 hereto attached.)

(*e*) Volume of new tonnage developed by United States Government $20,000,000 upper Mississippi improvement project, which will create commerce and transportation traffic on the upper Mississippi by furnishing 6 feet of minimum low-water depth of channel in place of the former inadequate 4½ feet, and by construction of Lake Superior-Mississippi link will project the commerce of the Mississippi into a through Lakes-to-the-Gulf channel.

(*f*) Volume of new river tonnage at Minneapolis by completion of Government high dam across Mississippi in Twin City district extending Mississippi River navigation into Minneapolis, to which the city of Minneapolis contributes $300,000 for municipal public docks, and to which Minneapolis manufacturers and jobbers have recently pledged 1,000,000 tons of new river merchandise tonnage.

(*g*) Volume of river-borne commerce that will be developed by completion of Panama Canal, extending Pacific Ocean commerce into Mississippi Valley, and by completion of the Lake Superior-Mississippi project extending such commerce into the Great Lakes.

(*h*) Volume of lake-canal-river commerce that will be developed by new $130,000,000 Erie Barge Canal and public terminals, the purpose of which is to secure the grain and flour tonnage of the upper Mississippi and Great Lakes region for New York Harbor in exchange for merchandise to be shipped from New York to the Northwest.

(*i*) Volume of new tonnage that will be produced by the 48 iron and steel mills, furnaces, coke ovens, cement works, and auxiliary plants of the Minnesota Steel Co. at Duluth, which occupy 2 miles of water front on the Duluth-Superior Harbor and will probably be in operation next year for conversion of the product of Minnesota iron mines into finished products for upper Mississippi Valley supply. This plant will also invite return cargoes from upper Mississippi and St. Croix Valleys of limestone for furnaces and cement works, brick and stone for construction work, and farm and mill produce for supply of Duluth-Superior mill, mine, and dock population. This company, which is a subsidiary of United States Steel, will likewise supply the American Bridge Co., another United States Steel subsidiary, with structural steel for its plants at Minneapolis, St. Louis, and other Mississippi River distributing points and for the new warehouse which it is building at St. Paul.

(*j*) Volume of increased coal tonnage of extensive new coal-handling plants now building at Duluth-Superior Harbor giving that harbor 20,000,000 tons of lake coal-handling capacity, with probable coal receipts for 1918 double those of 1912, and serving the double purpose of giving the lake iron-ore fleet return cargoes from Lake Erie and the upper Mississippi Valley high-grade Pittsburgh coal for the development of its manufacturing industries and for domestic consumption.

(*k*) Largely increased volume of products of general manufacture both in canal zone and all manufacturing centers of upper Mississippi Valley as resultant of following factors:

(1) Direct and indirect influence of Duluth-Superior steel and coal expansion with supplies of cheap and near-at-hand materials for hundreds of auxiliary manufacturing enterprises throughout the Northwest.

(2) New water-power developments on Mississippi, St. Croix, St. Louis, and Rainy Rivers and tributaries.

(3) Development of new hardwood, pulp wood, stone, and brick resources of upper St. Croix Valley.

(4) Addition of 250 miles of waterway transportation facilities at reduced rates, in conjunction with completion of Panama, Erie Barge, and Welland Ship Canals and $20,000,000 Mississippi River improvements, is logical forerunner of largely increased industrial tonnage.

SUMMARY OF ADDED TONNAGE OVER AND ABOVE 1912 LOCAL RAIL TRAFFIC.

22. First. Completion of industrial and transportation projects now in progress, directly or otherwise materially affecting Lake Superior and Mississippi River commerce and connecting canal zone, will reasonably produce by 1918 a traffic volume that will tax all available transportation facilities—rail, canal, and river.

Second. During six-year period, 1912–1918, normal development of industrial and commercial territory, including demands of new population and settlement and opening of lands, forests, mines, and starting of new towns and enterprises, require substantial addition to 1912 transportation facilities.

Third. Transportation routes, whether railway, highway, or waterway, are built on the basis, not of the commerce which actually passes before they exist, but of the commerce which reasonably will be developed as the result of their construction and operation in conjunction with other connecting routes working in cooperation for the development of resources.

Fourth. Chief among the considerations for opening a new route are its relations to other routes and its effect upon the success of connecting projects; and the principal commerce which the proposed project should develop is through tonnage as a link between the three greatest waterway projects of the United States Government, namely:

(*a*) Mississippi River, for which total expenditures, appropriations, and estimates for improvements in progress represent a prospective aggregate investment of $180,000,000—but without through channel of commerce.

(*b*) Great Lakes system, representing heavy investment for harbor and canal improvements, resulting in development of the principal volume of American water-borne commerce—80,000,000 tons of freight yearly at estimated value of $900,000,000—and yet without through channel.

(*c*) Panama Canal, representing ultimate investment of $375,000,000, its principal benefit to industrial interior depending upon Mississippi River and Great Lakes connections.

PROBLEM OF COMMERCIAL FEASIBILITY.

23. It will be admitted that the prospective tonnage demands of the canal zone and country tributary by the time the project can be completed and placed in operation will tax the railroads to full and yearly increasing capacity, as well as the river and proposed canal link working in cooperation, so far as volume of available tonnage is concerned. This resolves the question of commercial feasibility of proposed lake-to-river canal link to the one point, namely—the ability of the canal-and-river barge working on 6 feet minimum navigable depth of waterway to handle its due share of tonnage in competition with, or rather, in cooperation with, the box car.

ERIE CANAL RATE.

The comparative cost of transportation being a prime factor in the ability of the canal barge to secure and hold business, the engineers properly sought a standard rate for such waterway for comparison with the present rail rate and decided that the Erie Canal rate offers such a standard. Under normal conditions the Erie rate would be a fair standard of comparison, but we submit it is manifestly unfair to offer the Erie rate as a standard for comparison with proposed canal, because the Erie Canal has not been operated since 1885, except under decidedly adverse conditions tending to divert traffic from canal to rail and to increase costs of canal transportation. The adverse and abnormal conditions present on the Erie Canal during the entire period of comparison can and will be prevented from operating to the detriment of the

proposed canal. The hostile and adverse conditions which prevented the normal development of traffic on the Erie Canal have been fully described in the reports of the Inland Waterway Commission, National Waterway Commission, and report of the House Committee on Merchant Marine, from which we have heretofore freely quoted and embraced the following almost wholly and artificial and preventable adverse conditions:

(1) Ownership by railways of docks, terminals, elevators, loading and unloading facilities at Buffalo, New York, and other points along the canal and consequent control of charges for use thereof.

(2) Railway control of canal-boat lines and freight-forwarding agencies.

(3) Ownership of lines of vessels operating on the Great Lakes.

(4) Agreements between owners of rail lines east of Buffalo and New York and west of Duluth and Chicago.

(5) Discrimination against canal traffic aided by ownership and control of the foregoing agencies, all operating together to divert traffic from canal to rail, including refusal to make equitable through canal, lake and rail rates or divide such rates on any equitable basis; refusal of rail lines and vessels controlled by railways to carry freight from canal except at high local discriminating rates; refusal of rail or lake carriers controlled by railways to deliver freight to canal boats except canal boats owned or controlled by railways; refusal to permit independent canal boats to use docks, terminals, elevators, etc., except at high and discriminating rates or upon conditions giving railways absolute control of traffic on canal.

The effect of all the foregoing adverse conditions was to prevent improvement in type of canal boats, great loss of traffic on canal generally, failure to repair or keep up depth of canal, and altogether would have resulted in total abandonment of canal, except that the people of New York becoming aroused to threatened destruction of cheaper waterway transportation determined to rebuild canal and rehabilitate and restore canal commerce.

Under the circumstances the Erie Canal rate standard should be considerably discounted.

The information of the local board is, that the average Erie Canal rate is 3 mills per ton per mile; which would make the total freight charge for the 260-mile haul from Duluth to Minneapolis via proposed waterway 78 cents a ton.

Consensus of Erie Canal authority, however, appears to indicate that the Erie rate during the past 20 years, even under adverse conditions, is approximately 2 mills per ton-mile, and that modern methods and efficient administration devoid of hostile control would have materially reduced this average, even on the old canal and ancient-type boats, now practically abandoned to make way for the new barge canal which is nearing completion.

As the difference between 2 mills and 3 mills makes 25 cents per ton on the 250-mile haul, and therefore is material to the question of commercial feasibility, we take the liberty herewith to introduce authorities:

(*a*) Hon. A. Barton Hepburn (former Comptroller of Currency, president Chase National Bank, member New York Chamber of Commerce) on page 104 of Artificial Waterways and Commercial Advancement (Macmillan Co., 1909) publishes average New York canal and railway rates for 15-year period, 1903-1907 inclusive, as follows:

Average ton-mile rate.

5-year period.	Canal rate.	Railway rate.
	Mills.	*Mills.*
1893–1897	2.0	6.2
1898–1902	1.9	5.8
1903–1907	2.0	6.3

Fifteen-year average as found by Mr. Hepburn was 2 mills per ton-mile by canal, compared with 6.1 mills by rail; average 15-year by canal being one-third of rail rate. This canal rate was made by small old-type wooden canal boat. Engineering data was given showing that by modern methods the 240-ton boat could carry freight at 1.75 mills per ton-mile; while a 320-ton boat would reduce the rate to 1.16 mills, and 450-ton barge to 0.88 of 1 mill.

Mr. Hepburn deplored neglect of canal, which found "yearly expression in the loss of commerce to the city of New York," and charged railroad influences as "largely responsible for the inefficient canal policy of the State." Mr. Hepburn derived his information from New York canal commissions and engineers specially designated to secure reliable expert data. His high financial and business standing, both in city and nation, render him an authority in the field covered by his volume.

(*b*) United States Bureau of Railway Economics, 1911, quotes Erie Canal rate as 2 mills per ton-mile.

(*c*) United States Inland Waterways Commission (Government Printing Office, 1908, p. 238, quoting United States Statistical Abstract and reports of United States Department of Agriculture), publishes average annual canal and rail rates in New York for period of years, from which the following data for 1895–1905 are in comparative agreement with data of Mr. Hepburn:

Average railroad and canal freight rates per ton mile.[1]

Year.	New York Central R. R.	New York canals.	Year.	New York Central R. R.	New York canals.
	Mills.	*Mills.*		*Mills.*	*Mills.*
1895	7.26	1.50	1901	.....	2.30
1896	6.68	2.50	1902	6.30	2.50
1897	6.79	1.90	1903	6.40	2.70
1898	6.10	1.90	1904	6.60	2.10
1899	5.90	1.90	1905	6.10	2.60
1900	5.60	1.70			
			Average 1895-1905	6.37	2.14

[1] Wheat is the commodity chiefly used as a basis, and for the haul over the Erie Canal and river from Buffalo to New York.

During five years of the above period the rate was below 2 mills per ton-mile, ranging from 1.5 to 1.9 mills. Grain over the Erie is carried in the old wooden 240-ton barges of ancient type; whereas the proposed Lake Superior-Mississippi Canal will accommodate 550-ton barges. From 1901 on the Erie Canal the equipment was allowed to fall into neglect because the State was starting upon a new project which called for new and larger type barges; so that from 1901 to date the canal traffic passed largely into the hands of the railroad companies at increasing rates. It will be noted, however, that with all these handicaps the canal carried the freight at one-third the rail rate.

(*d*) The movement for the rehabilitation of the Erie and other New York canals took head under the administration of Gov. Theodore Roosevelt in the appointment of a State canal commission to investigate commerce and canals. The New York Produce Exchange and Chamber of Commerce took leadership in this movement with a view of restoring to New York its commerce with the West; New York grain receipts, including flour, having fallen off upward of 75,000,000 bushels. Through railroad control and neglect, New York grain receipts on the Erie Canal fell off in 25 years 50,000,000 bushels. In its report of 1901 (p. 9) the New York Canal Commission described the rate and the conditions on the Erie Canal as follows:

"On the canals of New York, where the boats are very small, the waterways greatly restricted, and obsolete methods are employed for handling business, it is about 2 mills per ton-mile."

(*e*) National Waterways Commission, in final report of 1912 (p. 574), says of the Erie Canal rate:

"The committee on canals in New York State in 1899 estimated that freight could be conveyed on the Erie Canal for 1.75 mills per ton-mile even after making allowance for the fact that a boat could only make seven trips during the season of navigation, and traveled one way with only a third of a load. As a matter of practice, the cost has averaged more than 2.45 mills, or an increase of 40 per cent, due to the lack of ideal conditions."

(*f*) Perhaps the most elaborate detailed engineering estimate of Erie Canal cost of transportation was that of Maj. Thomas W. Symonds, Corps of Engineers, which was made under the auspices of the New York Canal Commission. The report discusses condition and capacity of channel, type, capacity, speed and cost of canal boat, handling and cargoes of tow fleet, number of trips per

season, wages, subsistence, fuel, oil, insurance, motive power, and repairs, with 5 per cent interest on investment and for depreciation.

Even with antique 240-ton wooden canal boat making but seven trips a season, Maj. Symonds presents detailed data showing cost of hauling wheat from Buffalo to New York over Erie route 1.75 mills per ton-mile.

Applying same method to "Seymour" canal improvement plan allowing use of 320-ton boat, Maj. Symonds reduces ton-mile cost to 1.16 mills.

"Seymour-Adams plan," allowing use of 400-ton boat reduced cost, according to Maj. Symonds, to 1 mill per ton-mile; and "committee plan" providing for use of 450-ton boats made still further cut to 0.88 of 1 mill.

(*g*) Report of United States Engineers Potter, Shunk, and Peek (May 14, 1913) finds that Lake Superior-Mississippi River project will accommodate use of 550-ton barges. These have double capacity of old Erie barges, are up-to-date and best modern type, and make far better speed and several times as many trips in a season. Therefore, they should average a lower rate, and should do materially better than 2 mills per ton-mile, or 50 cents per ton for 250-mile haul. In section 99 of the report, the local board of engineers estimate that the canal fleet, consisting of tow vessel and four 550-ton barges, requires nine days for the round trip from Duluth to Minneapolis and return, or "25 round trips in a season." On the old Erie Canal, according to Maj. Symonds, the tow vessel handles four 240-ton barges at the rate of only seven round trips per season, and still does the work at 1.75 mills per ton-mile, including all operating and fixed charges. It appears that the situation on the Lake Superior-Mississippi River project, therefore, is more nearly analagous to the plans submitted by Maj. Symonds and the New York Canal Commission providing for the use of 400-ton and 450-ton barges at a cost of 1 mill per ton-mile.

COST OF TRANSPORTATION ON MONONGAHELA RIVER.

25. The Monongahela River, which joins the Allegheny at Pittsburgh to form the Ohio, offers the example of a waterway that has escaped control of hostile influence and is maintained by the Government in a condition for successful operation as a commercial waterway, just as the Erie during the past 20 years is a warning example of how a once successful waterway may be suffered through hostile influence to fall into a condition of neglect.

The Monongahela, year after year for years, has furnished Pittsburgh a large portion of its coal supply. It seldom handles less than 10,000,000 tons a year and from that up to 12,000,000. Monongahela barges deliver this coal at Pittsburgh at a transportation rate so low that railroad competition, so far as the rate is concerned, is out of question. At the same time, the Monongahela as a whole is a 6-foot project—6 of its 15 locks through the central section of its 131 miles from Fairmont to the mouth having only 5 to 6 feet depth on the lower sills—and the bulk of its freight is carried in boats, barges, and flats of 300 to 500 tons cargo capacity, such as readily would find ample navigable depth on the proposed Lake Superior-Mississippi River route.

(*a*) Chief of Engineers, United States Army (report of 1912, pt. 1, p. 894), says of effect of Monongahela on freight rates:

"The effect on freight rates of the slack-water system of the Monongahela is great. This is particularly true for coal, which is the principal article of commerce, and is well shown by a comparison of the railroad rates for carload lots along this river and those along the unimproved Allegheny. There are many mines along the Monongahela River that can ship by rail or by water, and within a distance of 45 miles from Pittsburgh, which practically covers the industrial district on that river, there is a rate of 10 cents a ton on hauls not exceeding 7 miles. For corresponding distances on the Allegheny the rates average about 35 cents a ton. One large consumer transports coal by river a distance of about 50 miles at a total cost of less than 10 cents a ton, including all charges, while the corresponding railroad freight rate is 45 cents a ton."

One the basis of the above official statement of the Chief of Engineers, the saving in cost of transportation by water, including all charges, is 35 cents a ton on a 50-mile haul.

(*b*) United States Inland Waterways Commission (p. 113 of 1908 report) states that the Jones & Laughlin Steel Co., through its coal and river navigation subsidiary, the Vesta Coal Co., enjoys on the Monongahela "the cheapest transportation service in the world, carrying coal between the mines and the mills, a distance of 48 miles, at the low cost of 3½ cents to 5 cents per ton."

On page 108 of the same report the commission gives the coal fleet of this company as 160 barges of 300 tons net cargo tonnage each and 31 barges of 500 tons each. Thus the record for low cost of transportation is made in river barges of the cargo capacity adapted to the proposed waterway project under discussion.

Excepting the three lower locks on the Monongahela in the Pittsburgh district, depth on the lower sill of Monongahela locks is similar to that on proposed Lake Superior-Mississippi project and on the upper Mississippi project. Twelve of the fifteen Monongahela locks (see Exhibit II hereto attached) have 5 to 7 feet depth on lower sills. Locks Nos. 4 to 9, inclusive, which are located in the middle section of the waterway, 40 miles to 100 miles above the Monongahela mouth, have depths ranging from 5.2 to 6 feet. During the dry season this section, as shown by reports of United States engineers, frequently has only 5 feet of navigable depth. Tow vessels and barges used on the Monongahela have average draft of 4 to 5 feet.

(*c*) Proceedings of Engineers Society of Western Pennsylvania (p. 270. June, 1908, session) contain the statement in regard to cost of coal transportation on Monongahela:

"A local interest tows its coal from pool No. 4 (located 41 to 58 miles above Pittsburgh) to Pittsburgh at cost of about 4 cents per ton by river—and that too on a stream where the lockages are limited to a certain extent—whereas the coal tariff rate by rail for the same distance is 33 cents per ton."

(*d*) In the same proceedings United States Engineer Thomas P. Roberts (United States engineer office, Pittsburgh) in a paper (p. 204) discussing Ohio and Monongahela transportation, including types, costs, and methods of handling river boats and fleets, predicts smaller but more numerous fleets at less capital investment and cost of transportation and concludes:

"We may expect, therefore, a lowering of freight rates on a river where the cost of transporting cargoes in fleets of barges is already lower than it now is with single 12,000-ton steamers on the Great Lakes."

(*e*) United States engineer office, Pittsburgh, by direction and in the absence of Lieut. Col. Francis R. Shunk, Corps of Engineers, transmitted to the commission on November 7, 1913, in answer to questions submitted in writing, the following detailed data of cost of transportation on Monongahela, prepared by Asst. Engineer Thomas P. Roberts (see Exhibit 3 attached):

"Several years ago the Jones & Laughlin Steel Co. reported officially that the actual cost to them of moving coal from their mines to their mills and coke ovens in Pittsburgh, then doing a business of 2,000,000 tons per annum, was 4.2 cents per ton. The round trip distance was 104 miles, including the passage of three locks in each direction. The estimate included the return of the empty boats to the mines. The final result was a ton-mile rate of 0.08 cent. To this was added by this office interest account on capital invested at 5 per cent and 15 per cent for depreciation of floating plant, which brought the ton-mile rate up to 0.18 cent, or 1.8 mills."

On this computation the cost of operation was eight-tenths of 1 mill per ton-mile, while 20 per cent to cover interest and depreciation added 1 mill more. This estimate of 20 per cent for fixed charges would pay for first cost of fleet in five years, and would appear unnecessarily high. If the more common estimate of 10 per cent for interest and depreciation were used, the total cost of transportation would be 1.3 mills per ton-mile.

The same inclosure (Exhibit 3) gives average capacity of Monongahela boats, barges, and flats at 200 to 500 tons; and that the Pittsburgh district (for several years past) receives about 12,000,000 tons of cargo coal per annum.

(*f*) The Chief of Engineers, United States Army, in his report for 1912 (p. 905, pt. 1) sums up the case thus:

"A comparison of the cost of delivery of Monongahela River coal by rail and by river to points in the pools above Dam 6 shows a saving of from 30 to 50 cents a ton in favor of water transportation."

(*g*) In answer to the inquiry of the Minnesota commission for detail on which the above estimate was based, United States engineer office, Pittsburgh, by Chief Clerk A. J. Rossiter, for and in the absence of Lieut. Col. Francis R. Shunk, Corps of Engineers, forwarded November 14, 1913, the following information (see Exhibit 4) prepared by Thomas P. Roberts, assistant engineer:

"Reference is to Dam 6 on the Ohio, about 29 miles below Pittsburgh. The center of the active river mining district on the Monongahela is about 50 miles above the city. The 50-cent saving is therefore for the 29 plus 50, or 79-mile distance, and the 30 cents for the 50-mile distance to Pittsburgh."

APPLICATION OF MONONGAHELA RIVER AND ERIE CANAL RATES TO PROJECT.

26. Following are some of the features which make water transportation on the Monongahela and Erie similar to that on Lake Superior-Mississippi Canal and upper Mississippi:

(*a*) *Depth of navigable channel.*—Coal originating on pool No. 4 on Monongahela, 50 miles above Pittsburgh, passes Lock No. 4 (Exhibit 2) which has 5.87 feet depth on lower sill and at time above detailed statistics were furnished had dimensions of 158 by 50 feet. Locks on Lake Superior project as proposed by engineers have 6 feet minimum depth and are 175 by 35 feet. Although former depth of Erie was nominally 7 feet, actual navigable depth was allowed by neglect to fall to about 5 feet and permitted boats of only 4 to 4½ feet draft and 240 tons of cargo.

(*b*) *Cargo capacity of boats and barges.*—United States Engineers report 550-ton barges adapted to Lake Superior-Mississippi projects. Vesta Coal Co. which makes record of 4 to 5 cents per ton on coal for 50-mile haul and return trip on empties—or less than 10 cents, including all charges as reported by the Chief of Engineers—uses 160 boats of 300 tons cargo capacity and 30 barges of 500 tons. One of its principal model towing vessels, the *Vesta*, which tows five to seven 500-ton barges, and has speed of 10 to 12 miles an hour, has draft of 4.1 feet. On Erie Canal only 240-ton boats were used. On Champlain Canal, during season of 1913, canal boats carrying coal from New York Harbor to Montreal and Quebec were allowed to load only 160 tons, and tow vessels with capacity of 13 boats were allowed to haul only five because of condition of canal, and yet the canal-and-river route of 320 miles from Perth Amboy to Quebec took the coal business away from both the railways and ocean vessels.

(*c*) *Return cargoes for canal and river.*—Monongahela coal barges which haul 10,000,000 tons of coal to Pittsburgh have no return cargoes, and the low rate made covered cost of return trip of empties. Wheat boats which carried the heavy grain tonnage on the Erie from Buffalo to New York made the return trip with only one-third cargoes, because merchandise on the average makes light tonnage. The Lake Superior-Mississippi project, on the other hand, has cargoes both ways. Coal, iron, steel, cement, and merchandise comprise the down tonnage from the Lakes. Wheat and coarse grain from one of the leading grain districts of the world, flour from the greatest flour-milling center on the globe, linseed oil and cake from the chief linseed manufacturing center, limestone from the St. Croix and upper Mississippi ledges for Duluth-Superior furnaces and cement works, potatoes and general farm produce for the mine, mill, and dock population on the Lakes and for eastern shipment, brick and various building materials for lake and eastern construction enterprises—constitute a return tonnage which does not exist on either Monongahela or Erie. Then there is the through tonnage from the Mississippi Valley and Gulf, and varied local tonnage arising in canal zone.

(*d*) *Rates which such conditions afford.*—Under parallel conditions, or in several respects less favorable conditions, on the Monongahela River and Erie Canal, barge and boat equipment of capacity similar to that recommended by engineers for Lake Superior-Mississippi project shows transportation cost of 1 to 2 mills per ton-mile. This would be 25 to 50 cents per ton for the Duluth-Minneapolis haul, as compared with $1.02, which engineers estimate as average rail charge. Under such conditions the project should have no difficulty in securing and holding its due share of the large tonnage which will tax rail, canal, and river by the time the canal link can be completed and put in operation; and thus insure the commercial feasibility of the barge route, in competition with, or in cooperation with, the box car.

(*e*) *Advantages of new and up-to-date equipment, methods of handling, and mode of administration, and of new and rapidly growing territory and resources.*—The new enterprise, moreover, will be launched under new and hopeful auspices, free from hostile influences or control, when the country is turning to waterways as a necessary aid to railways, and will have new and up-to-date equipment and administration in a section of tremendous resources and yearly development.

WATERWAY FROM ALABAMA COAL FIELDS TO MOBILE.

27. The Government is now entering upon the completion of the 6-foot navigation project of canalizing the Mobile, Tombigbee, Warrior, and Black Warrior Rivers for a distance of 443 miles from Mobile Bay to the northern Alabama coal fields. Estimated cost is $8,675,000, and about 20 locks and dams are

required. The Alabama and New Orleans Transportation Co. is having 15 steel self-propelling producer-gas barges built by the Great Lakes Engineering Works, of Detroit, for the development of the coal fields and the transportation of the product to Mobile, New Orleans, and Pensacola. The first barges have started upon their work.

In an article in the Engineering News of December 4, 1913, the barges used by the above company are fully described as well as the canal and waterway upon which the fleet of barges operate. Mr. John H. Bernhard, the designer and builder of the barges used by the above company, in a letter to the counsel for the Minnesota commission, dated April 9, 1914, says:

"At present the Alabama & New Orleans Transportation Co. has seven finished barges of the type described in said article; said barges have been running for several months, the first one being in operation since July of last year and beyond the troubles resulting from inexperienced crews have given perfect satisfaction, moving their freight (in this instance coal) at less than two-fifths mill per ton-mile.

"The barges are designed for 6-foot navigation and indeed have to meet a great variation of conditions in the water route as to depth, width, and swiftness of current. The river runs through the coal fields and the coal is dumped from the mine cars into the loading station from which the 1,000-ton barges are loaded with their cargo at the rate of 500 tons per hour. It costs approximately 2¼ cents per ton to load and 3 cents per ton to unload.

"I believe the barges would be especially adapted for use from Lake Superior through the St. Croix River to the Mississippi River and thence down said stream.

"I am positively sure of the above cost of loading and unloading which is a matter of record in our office and will be able to prove to any one at any time the correctness of said figures.

"I note the local engineers charge the canal 25 cents to load and 25 cents to unload, and beg to state that they are making a serious blunder. In Norfolk, coal is loaded into the bunkers of seagoing vessels for a total cost, including trimming, of 7 cents per ton, but, where the vessel is a self-trimmer, as these barges are, only 4½ cents per ton is charged.

"I note further that the local board of engineers have charged that the coal is deteriorating 25 cents per ton on acount of handling with the clam shell. To be short in my reply to this, I would like them to quote me one instance where this has cost such an amount of money. I can cite instance after instance where coal has been handled by clamshells and deterioration is not sufficient to take account of in figures.

"It will be possible to build self-propelled barges that would operate economically on the canal under discussion with a carrying capacity of 500 tons, and I would undertake to state that you should be able to handle coal from Lake Superior to the Mississippi River, including cost of loading and unloading, for less than 25 cents per ton.

"JOHN H. BERNHARD."

The Lake Superior-Mississippi River project, like the Alabama project, will find coal its chief commodity. The rate of 30 cents per ton on coal from Lake Erie to Duluth-Superior equals in cost a haul of 50 miles by rail. This is equivalent to the location of the lake terminus of the Lake Superior-Mississippi Canal within 50 miles by rail of the Lake Erie ports which handle 24,000,000 tons of Pennsylvania, Ohio, and West Virginia coal. The Alabama project has a haul of 443 miles from the northern coal fields; while the Lake Superior-Mississippi project has a haul of 210 miles from the lake supply to the Mississippi River, and a large group of upper Mississippi distributing centers and river terminals for the consumption and distribution of its coal cargoes; 237 miles to St. Paul and 250 miles to Minneapolis. The logic which justifies the Alabama project, therefore, applies with force to the Lake Superior-Mississippi project; for Minnesota and Wisconsin produce no coal, and the source of the best and cheapest coal for about 2,000,000 population in the cities and counties of the canal zone and tributary to the Mississippi in those States, is the Great Lakes supply which has the 30-cent rate from Lake Erie.

KANSAS CITY RIVER TRANSPORTATION PROJECT.

28. Another navigation project authorized by the Government is $20,000,000 to provide a 6-foot channel for the 408 miles from Kansas City to the mouth of the Missouri River. Kansas City merchants and manufacturers have

organized the Kansas City Missouri River Navigation Co., a million dollar boat line, and opened river service from Kansas City to St. Louis on present 4½-foot depth. Three modern steel tow vessels of the tunnel-screw type and seven barges have been installed in freight service; and the city is providing proper public docks and freight terminals.

The above company commenced operations last season on the unimproved river, handling a comparatively small tonnage on account of the unusually low water occasioned by very severe drought in the district. The fleet handled very little bulk freight, most of the tonnage being package freight and a great deal of it high class. We quote from a letter from the secretary of the Kansas City Missouri River Navigation Co.:

"Our rates are uniformly 20 per cent lower than the rail rates between the points we reach, and we absorb the switching charges on carloads, so as to give the shipper a net saving of 20 per cent as compared to rail rates."

Thus Alabama, Missouri, and Monongahela projects are all 6-foot channel projects, and will float the same capacity of river barges as the upper Mississippi 6-foot project and the proposed Lake Superior-Mississippi 6-foot project; and the commercial feasibility of these 6-foot projects successfully competing with the railroad is sustained by the action of the Government. If it is commercially feasible to expend $20,000,000 to give Kansas City and the valley of the lower Missouri transportation access by water with the Mississippi, similar logic would find it commercially feasible to expend $7,815,000 to give the Mississippi Valley a through channel into Lake Superior, the commerce of which, as measured by the Soo Canal, includes 75,000,000 tons of freight valued at $800,000,000.

TRAFFIC EXTENSION ON ALLEGHENY AND MONONGAHELA.

30. The Chief of Engineers, United States Army (1912 report, 897–899), discusses project adopted by Congress for construction of five additional locks and dams on the Allegheny to extend slack-water navigation to a point 61 miles above its confluence with the Monongahela, at cost of $2,788,000. On that part of project already completed, 1,374,626 tons of coal were moved in 1911. The purpose, as defined by the Chief of Engineers, is "to give manufacturing plants in this section the benefit of the cheap river rates on coal and other supplies. * * * Even under existing conditions one large consumer of coal reports a saving of 25 cents per ton on Monongahela River coal delivered by water, compared with delivery by rail."

Similar benefits of cheap water rates would accrue to the Northwest on coal, iron, and steel from Duluth-Superior Harbor to manufacturing plants at Stillwater, Hastings, St. Paul, Minneapolis, South St. Paul, Red Wing, Lake City, Wabasha, Winona, La Crosse, and Eau Claire, and other tributary river manufacturing centers, which have an aggregate city population of 750,000, with an assessed taxable valuation of $400,000,000, and whose 2,100 manufacturing plants, according to the United States industrial census of 1909, employed $185,000,000 of capital and turned out a product valued at $260,000,000.

Expansion of river coal and steel traffic up the Monongahela River and on the upper Ohio is described on page 9 of the final report of the National Waterways Commission (1912). Reference is made to the new works of the American Bridge Co., at Ambridge, 15 miles below Pittsburgh, for the manufacture of steel barges, scows, and other steel water craft, and also to the water navigation plans of the Crucible Steel Co. of America, which "is practically ready to commence transporting its coal by water from the sixth pool in the Monongahela River to its mills and factories at Pittsburgh and at Midland, 36 miles below. This coal was formerly obtained entirely by rail. This company expects to transport by river about 1,000,000 tons of coal annually, and also to transport its pig iron and steel products by water to lower river ports."

The sixth pool on the Monongahela, where this company gets its coal, is located 7 miles above Pittsburgh, and the depth on the lower sills of (see Exhibit 2) Locks 4, 5, and 6, which the coal barges pass, is only 5.2 to 5.8 feet. Moreover, the river bank for this haul is thickly paralleled with competing coal railroads, which makes a convincing practical argument for the superior commercial feasibility of the waterway, as compared with railway, in coal transportation.

If further demonstration were required of the superiority of water transportation in coal handling, it is furnished in the fact that the Pittsburgh Coal

Co., which is the leading coal company for the supply of Duluth-Superior and the proposed canal zone, including the Twin Cities, has acquired possession of the largest bulk coal carrier on the Ohio, Mississippi, and tributaries, namely, the Monongahela River Consolidated Coal & Coke Co., which operates 80 towboats and steamers and 4,000 coal boats, flats, and barges, with cargo capacity of over 2,500,000 tons, and handles by river 4,500,000 tons of coal per annum.

As showing what the leading steel corporation in the world thinks of the commercial feasibility of river transportation of coal—although this corporation itself owns and operates railroads—the contract made by the United States Steel Corporation with the Pittsburgh Coal Co., as shown by Government testimony, by which the coal company for a period of 25 years is to provide the steel company with coal for its use, through the Monongahela River Consolidated Coal & Coke Co., requires delivery by water whenever possible because cheaper.

The steel company's further recognition of the superior commercial feasibility of river over rail in coal transportation is shown by the enterprises and operations of two of its distinguished subsidiary companies, namely, American Steel & Wire has installed a fleet of 100 barges and towboats for moving its coal on the third and sixth pools in the Monongahela River to its mills at Donora, Rankin, and Braddock, and to its Schoenberger mill on the Allegheny; while the American Bridge Co. is building for various United States Steel plants located on rivers and canals the necessary barges, towboats, and other steel watercraft.

CAUSES OF DECLINE OF RIVER COAL AT CINCINNATI.

31. Col. Potter and associate engineers express apprehension of the ability of the Lake Superior-Mississippi canal and river route to secure and hold the canal tonnage because of certain experience of Cincinnati in regard to the Ohio River coal business. Quoting a letter from the Cincinnati Chamber of Commerce, in which the railroads are cited as cutting into the river traffic, Col. Potter says that this "indicates that the railroads are running the Ohio River, the greatest coal river in the world, out of the coal business, on a haul of 200 or 300 miles, although the actual difference in freight rate in favor of the water haul is 37½ to 50 cents."

The apprehension thus expressed is not borne out by recent traffic data. At the same time it is plain that certain coal-carrying railroad companies did make a well-concerted effort to throttle the Cincinnati river coal business. As brought out by Government investigation by Congress and the Bureau of Corporations, the coal roads brought the following methods to bear in depriving the river lines of coal traffic: (1) Purchase of competing lines which handle river coal, (2) control of terminals and terminal charges, (3) discriminating joint rates and prorating against river carriers, (4) secret rates, (5) discriminating switching charges, (6) purchase of controlling interest in coal lands and mines.

Remedy for such practices, however, lies in Government prosecution and control of traffic and not in defeating the opening of additional waterways. That the conditions at Cincinnati have already been materially righted is shown by the statistics by The Coal Trade (1913), Frederick E. Saward, editor: Cincinnati coal receipts from the Kanawha River increasing from 867,560 tons in 1908 to 1,531,572 in 1911, and the river receipts from the Pittsburgh district increasing from 535,880 tons in 1908 to 1,313,981 in 1912. Thus the causes of apprehension at this point are already removed.

Indeed, the 1912 report of the Chief of Engineers, United States Army (p. 2366), indicates that river coal traffic on the Kanawha River canalized project has been highly feasible from a commercial standpoint. In 1911 the 55-mile haul through the Kanawha locks bore a coal cargo of 1,346,140 tons at the rate of 0.97 of 1 mill per ton-mile. The report also shows that between Charleston and Montgomery, W. Va., the rail charge of 50 cents per ton has been reduced by the canalized river to 5 cents per ton, an achievement stamped with a high order of commercial feasibility.

THE CHIEF OF ENGINEERS ON UPPER OHIO RIVER TONNAGE.

32. By way of further relieving the apprehensions of the local board of engineers with reference to defeat of inland waterway transportation of freight, the Ohio River system in particular, through action of the cause specified, to wit, "the railways are running the Ohio River, the greatest coal river in the world, out of the coal business," we herewith summarize the freight tonnage, of which

coal is the leading commodity, of the Ohio and principal tributaries for the year 1911, as reported by the Chief of Engineers, United States Army, to the Secretary of War, Washington, D. C., October 8, 1912, as follows:

River.	Page of report.	River tonnage, 1911.	River.	Page of report.	River tonnage, 1911.
Monongahela	2308	[1] 10,747,041	Muskingum	2370	72,145
Allegheny	2311	[2] 1,720,742	Big Sandy	2390	181,770
Pittsburgh Harbor	2341	[3] 12,519,776	Kentucky	2406	209,249
Locks 1 to 6, Ohio	2337	4,105,649	Louisville & Portland Canal	2426	944,656
Kanawha	2366	1,392,788	Green River, Lock 1	2444	329,032
Little Kanawha	2360	120,244	Ohio River commerce	2287	[4] 11,771,892

[1] Estimate of which report says: "Which amount is manifestly less than the actual movement of commerce." The 15 Monongahela locks show a total of 28,442,579 tons of down-river tonnage and 2,786,396 of up-river tonnage. To eliminate duplications, United States engineers took downstream tonnage at Lock 3, plus upstream tonnage at Lock 1, plus coal mined in pools 1 and 2, as a basis for estimate. This, of course, covers business in and out of Pittsburgh Harbor, but omits commerce which begins and ends between mines and mills and towns located between Locks 3 to 15, inclusive, covering 90 miles of the total 131 miles of the canalized river between Pittsburgh and head of slackwater, 4 miles above Fairmont, W. Va., which doubtless would extend the Monongahela River total to 12,000,000 tons.

[2] This is simply the tonnage reported by leading shippers, and would exclude a large number of small or intermittent shippers and others not filing regular reports.

[3] Largely local business of mines and mills, coke ovens and furnaces in Pittsburgh district, including some through tonnage from Monongahela mines to Ohio and Mississippi points.

[4] Reported by Col. Jervey in chapter on first Cincinnati district of the Ohio River, and doubtless covers tonnage passing through that district.

SUMMARY OF UPPER OHIO AND TRIBUTARY RIVER TRAFFIC.

33. It is difficult to estimate how much of the total 44,000,000 tons of freight handled by river boats and barges on the Ohio and upper tributaries is net tonnage and how much should be eliminated as duplication. Omitting the 12,500,000 of Pittsburgh Harbor and 11,700,000 of Ohio River proper, we have 20,000,000 tons on the tributaries. To this should be added that which originates for Ohio and Mississippi commerce in the upper Ohio ports exclusive of the tributaries. This would doubtless make a total net tonnage of somewhere between 25,000,000 and 30,000,000 tons. It would therefore appear that, in spite of all natural and likewise all abnormal and preventable obstacles which have hampered river commerce on the Ohio and upper tributaries, traffic has demonstrated the commercial feasibility of inland waterways in the United States and justified the faith of the Government and the loyal efforts of the engineers in charge.

Summarizing these results with reference to features applicable to proposed Lake Superior-Mississippi river-and-canal route we find:

(*a*) That 20,000,000 tons of freight are carried on canalized tributaries of the Ohio River at rates so far below rail rates that industrial interests affiliated with railways are compelled to use the slack-water barge fleet in preference to the roads paralleling the streams.

(*b*) That these canalized tributaries are Government 6-foot depth of channel projects financed and operated by the General Government.

(*c*) That the boats, barges, and tow vessels used are of the draft and cargo capacity recommended by the engineers for the Lake Superior-Mississippi 6-foot project.

(*d*) That, on the authority of the engineer in charge on the Monongahela, the 500-ton barges delivering coal in that district have reduced cost of transportation to the basis of the 12,000-ton barges on the Great Lakes—the lowest transportation cost known.

(*e*) That, on the authority of the Chief of Engineers, United States Army, the saving is as much as 30 cents per ton on a 50-mile haul and 50 cents on a 79-mile haul which applied to the Lake Superior-Mississippi coal haul would commercially justify the project.

(*f*) That the practical experience and close engineering estimates of the leading coal, iron, and steel interests of the greatest coal, iron, and steel district in the world compel them to substitute the 500-ton barge for the box car in handling their products, notwithstanding their own railway affiliation and even ownership and operation of coal roads.

Finally, we find that these same industrial interests of the Pittsburgh coal, iron, and steel district now propose to finance the construction of a $60,000,000 canal from Pittsburgh to Lake Erie, so as to secure the commercial benefits of low canal cost of transportation to the Great Lakes—even though the actual cost of rail transportation over roads owned and operated by them over that route is reported as low as 3 mills per ton-mile.

PAST OBSTACLES NOT NECESSARILY APPLICABLE TO FUTURE PROJECTS.

34. Among the preventable obstacles over which this successful river commerce has triumphed—obstacles which under the present temper and probable future policy of the Government and of the public in this country will find little toleration and excuse for existence—may be briefly enumerated the following, the abatement or amelioration of which is a material factor favorable to the pending project:

(*a*) Lack of a defined national waterway policy with necessary executive powers and funds to make such policy effective.

(*b*) Lack of standardization in depth of channel and type of equipment so as to create channels of commerce.

(*c*) Lack of coordination in projects undertaken so as to create an interlocking system of waterways necessary to the existence of channels of waterway commerce.

(*d*) Failure of past Congresses to provide Government engineers with means to put into successful operation projects undertaken.

(*e*) Failure to give the Interstate Commerce Commission sufficient jurisdiction over waterway and joint water-and-rail transportation to prevent destruction of river-and-canal traffic by discriminating railway rates and prohibitive terminal and switching charges, by refusal to provide connecting railway service with joint through rates for water lines and carriers, and rebates, secret rates, and intimidation of shippers.

(*f*) Failure of the Government to prevent railway control of canals, terminals, waterway equipment, and water transportation agencies and traffic.

(*g*) Consequent railway control of waterway channels, terminals, frontage, and boat lines; paralleling of rivers and canals with tracks preventing waterway locations for mercantile and manufacturing plants and sites necessary for handling water-borne freight; erection of low bridges prohibiting use of large-type boats; diversion of traffic so as to substitute a profitable rail haul for low-cost water service; arbitrary terminal charges killing river commerce; and general neglect of waterway and bankruptcy of boat-line owners.

Detailed data and citations on this phase of the subject, in addition to those herein quoted, may be had by consulting reports of the Chief of Engineers, United States Army; reports of Bureau of Corporations of the Department of Commerce, of House Committee on the Merchant Marine and Inland Waterways, of the National Waterways Commission, of the Interstate Commerce Commission, and of testimony of business men and naval and marine engineers, experts, shippers, boat owners, and operators before various Government authorities.

Consideration of the above conditions in connection with proposed report is made necessary and germane to the question of commercial feasibility by reason of the position taken by the local board of engineers, in the report of May 14, 1913, in assuming as fundamental to the operation of the canal and the receipt, distribution, and terminal handling of traffic such arbitrary conditions as the following: (1) A terminal charge of 25 cents per ton at each end of the barge route, which at the outset would perhaps kill any inland waterway project; (2) dependence upon arbitrary will of competing roads for any traffic whatever; (3) control of terminals, terminal freight handling, and terminal charges by railroads; (4) railroad-owned boat lines on the Great Lakes at harbor connection with canal; (5) "railroad-controlled" elevators assessing all river-and-canal grain shipments with charges of 18 cents to 44 cents per ton at all loading, unloading, and transfer points; (6) railway charges of 35 cents per ton on flour, even to get flour from the mill on the river bank to the barge close at hand; (7) arbitrary influence of railway companies in diverting traffic, refusing cooperative connecting service, and by arbitrary prorates, joint rates, switching and terminal charges taxing water traffic out of existence.

In regard to all of which it is sufficient to state, that railway companies have no lawful power at this time to impose such hostile conditions, and that

the attempt at such exactions would render them liable to Government and State prosecution.

GOVERNMENT ADMINISTRATION OF WATERWAY AND CONNECTING RAILWAY.

35. Commercial success of the waterway in handling the inland traffic of Germany, Belgium, Holland, France, and other European countries is due in large measure to an efficient and commercially scientific system of governmental administration. There the Government which owns the waterway attends to its executive administration as a public business enterprise, just as our Government does with its post offices and is preparing to do with the Panama Canal. The result is that the canals and canalized rivers of these countries are kept in efficient condition for commerce; the relations between waterway and railway are placed on a cooperative basis with mutual and reciprocal benefit to each; the industries of the country are developed and given cheap and efficient access to the seaboard; while the commerce of the inland waterways has grown at a rate exceeding the rate of population growth, and even slightly in excess of the growth of tonnage handled by rail. Grain is to-day hauled a distance of 300 miles on the Rhine at one-fourth of the Iowa distance tariff rate by rail, and coal is hauled 200 miles at 48 per cent of the Hocking coal district rate to the lake. (See 1912 report of National Waterways Commission, pp. 568–569.) The 100,000,000 tons of inland commerce hauled by the canals and canalized rivers of Germany demonstrate the value of effective administration by government, as well as the commercial potency of the inland waterway in developing the now greatest industrial power in Europe.

Among the features of such effective administration are:

(*a*) Grant of sufficient powers by Congress to an executive department to organize and administer the inland waterways of the United States as modern business enterprises in America, and as waterways are successfully administered in the most successful foreign countries.

(*b*) Extend the powers of the Interstate Commerce Commission to cover waterways and joint river-and-water transportation, with complete control over interstate rates, prorates, joint rates, and terminal charges.

Measures looking to these ends are now before Congress, and doubtless will be in effect by the time the proposed project can be completed and placed in operation. This removes from necessity of present calculation the source of the chief obstacle to commercial feasibility, as advanced by the local board of engineers with reference to the Lake Superior-Mississippi waterway project. Efficient governmental administration and governmental regulation of rates and terminal charges will eliminate the arbitrary and unreasonable terminal exactions by connecting railroads, which is the basis of the high cost of canal-and-river transportation as estimated in the board's schedules, and will also provide for a system of cooperative effort between railway and waterway which will develop the profitable commerce of both, together with the industries of the canal zone in the Lake Superior and Mississippi industrial region, as in Germany, Holland, Belgium, France, and Austria-Hungary.

PUBLIC OWNERSHIP AND CONTROL OF TERMINALS.

36. Terminals largely control receipt and distribution of tonnage. The waterway being public property under public administration, it is essential to the commercial success of the enterprise that the terminals likewise shall be publicly owned and controlled. Failure in this respect is admittedly the principal cause of the failure of many of the canals and Government waterway projects of this country in the past to secure and hold business. It is elemental that the success of any enterprise rests, primarily, upon the effective grant to the management of ample power to administer the controlling factors essential to the legitimate success of the enterprise. Certainly success is not possible when the controlling factors are in the hands of a competitor who is unfriendly to the success of the enterprise in question, as is the case when the docks, water frontage, and terminal facilities upon which the waterway depends for traffic are in possession and control of a competing railway.

Public ownership and control of docks and other terminal waterway facilities is common in the countries of Europe except Great Britain, where waterways, as a consequence, have not met with complete success. Until recently only the States of California and Louisiana in this country protected the rights of water

carriers by public administration of waterway terminals. The past two years, however, have inaugurated a widespread movement for public ownership and control of docks, water frontage, and terminal handling facilities at the principal harbors along our coasts, and the movement has begun at interior ports. Among such harbor and inland port cities now building State and municipal docks and terminals for water-borne freight may be mentioned New York, Boston, Philadelphia, Jacksonville, Pensacola, Mobile, New Orleans, Galveston, Houston, Los Angeles, San Diego, San Francisco, Oakland, Portland, Seattle, Chicago, St. Louis, Kansas City, Davenport, and Minneapolis. Total bonds authorized for issue by States and municipalities for such public terminals approximate $200,000,000. Leading Canadian harbor cities are equally public spirited and enterprising in the cause of the development of their public water terminals and commerce.

The feature of this movement specifically germane to the project at hand is this: That such public terminals furnish the waterway with terminal facilities at cost, as a substitute for present arbitrary terminal exactions levied by competing private carriers, to wit, in place of the 25-cent and 35-cent terminal charge estimated by the local board of engineers for transfer from lake barge to canal barge at Duluth-Superior and again for transfer at the St. Paul or Minneapolis terminal, such charge will be reduced by the public terminal to actual cost of handling, which is on the average 2 to 5 cents per ton.

COST OF HANDLING COAL.

The principal difficulty of the local board of engineers with reference to calculating the commercial feasibility of the Lake Superior and Mississippi River Canal project appears to have arisen in accepting the statements of those opposed to the project that the railroad terminal arbitrary charge of 25 cents per ton as the actual cost of handling the coal at the river terminal in the Twin Cities is 25 cents per ton, the cost of deterioration of one extra handling of the coal by clam shell, 25 cents per ton, and the cost of delivery from terminal in Twin Cities to coal yard or carload consumer 25 cents per ton. These arbitrary charges assumed to exist, load the coal traffic with 75 cents per ton tax and are sufficient to kill this project so far as carrying coal is concerned. We think the assumed charges are arbitrary and can be demonstrated to be erroneous. As hereafter shown, the coal can be handled at the river terminals from barge to dock or stock pile for a maximum of 3 cents per ton and from dock to railway car, including screenings, for a maximum of 10 cents per ton; that the diminution in value of coal by extra handling by clam shell from barge to dock or stock pile is so small as to amount to nothing at all and is fully offset by the shaking up of the coal when carried in a bumping box car from the Lakes to the Twin Cities, a distance of from 150 to 170 miles. This item of alleged deterioration of coal is fully discussed in the correspondence from the Bureau of Mines of the United States and the report of the Ohio Coal Commission, later herein fully referred to and quoted from. The item of 25 cents per ton for delivery from river terminal to coal yard or carload consumer is equally nonexistent. Only a very small percentage of the total coal consumed in the Twin Cities is delivered in carload lots on industrial tracks to actual carload consumers. As to such deliveries there would be a switching charge of $2 per car from river terminal to sidetrack amounting to 5 cents per ton. As to all other coal consumed in the Twin Cities the delivery would be direct from barge to stock pile situate right in the coal yard. Notwithstanding the statement of the local board to the contrary, there is ample room in each of the Twin Cities adjacent to the river banks for all the coal yards required to supply all coal consumed in the Twin Cities, and they would be at once installed to take advantage of the lower rates afforded by the canal. Guaranty of installation of proper terminals and coal yards can and will be made by the commercial organizations and business men of the Twin Cities to the satisfaction of the general board. As to coal reshipped by rail from Stillwater, Hastings, and other Mississippi terminals and the Twin Cities, the rate would be covered by the new distance tariff law enacted in Minnesota in 1913 instead of the through rate from Duluth to interior points in Minnesota. So that the canal coal would not be prevented by discriminating rates in favor of railways from going forward to interior points. The cost of screening coal and loading cars at river terminals would not be greater than similar cost of loading cars at the docks at Duluth-Superior.

As these errors are vital to the question of commercial feasibility of the enterprise—and indeed of all other inland waterway projects—and are the principal factors in the failure of the local board to find this project commercially feasible, we have given this subject careful detailed study, have obtained the estimates of the engineers of the leading manufacturers installing coal-handling and other freight-handling plants in this country, and collected available data of leading Government and transportation authorities, of which the following is a summary in outline:

(*a*) The Chief of Engineers, United States Army (p. 894, 1912 report):

"One large consumer transports coal by river a distance of about 50 miles at a cost of less than 10 cents a ton, including all charges, while the corresponding railroad freight rate is 45 cents a ton."

As will be seen by subsequent testimony of the United States engineers' office at Pittsburgh, hereafter appended, it was specifically understood that the phrase "including all charges" covered loading and unloading charges. Of course, it is apparent that a cost of less than 10 cents to cover transportation plus loading and unloading leaves only a small percentage of the local board estimate of 25 cents at each end of haul—possibly 2 cents or 3 cents per ton at each end—as actual cost of loading and unloading river barge.

(*b*) Report of Lieut. Col. Mason M. Patrick, Corps of Engineers, United States Army, (p. 6 of Statistical Report of Lake Commerce passing through canals at Sault Ste. Marie, Mich., and Ontario, during season of 1912):

Under the head of "Transportation charges, including loading and unloading, on freight passing through canals at Sault Ste. Marie, Mich., and Ontario, for the season of 1912," we find as the first tabulated item: "Coal, short tons 14,931,594, rate per unit, 30 cents."

It is apparent that with only 30 cents per ton as the lake boat cost of transportation, "including loading and unloading," from Lake Erie to Lake Superior, that again the actual cost of loading and unloading at the two ends of the route must be substantially less than the 25 cents at each end accepted by the local board.

(*c*) New York Harbor handles more coal than any other port on the globe. Coal destined for Manhattan Island, Long Island, Staten Island, and other parts of Greater New York, necessarily is delivered by water, the coal trains unloading at various points on the mainland at distances of 2 to 20 miles from the metropolitan docks, and brought to city wharves (sometimes by train floats), but usually in 500 to 600 ton barges. New York, therefore, offers a prime object lesson of the commercial feasibility of water delivery of coal.

F. W. Saward, manager of the Coal Trade Journal, a recognized coal trade authority of general and long standing in America, in a letter of October 4, 1913, addressed to the writer (see Exhibit 5), estimates the total coal tonnage received at New York Harbor as approximating 40,000,000 tons per annum; and estimates cost of unloading from boats with modern machines as "of itself a small matter, amounting to 3 or 4 cents a ton."

(*d*) Secretary of Commerce William C. Redfield, in a recent informal address before the convention of naval architects and marine engineers, gave the result of a statistical inquiry which he instituted to ascertain what percentage of the 30 cents per ton cost of transportation by lake from Lake Erie to Lake Superior represented cost of handling at the two ends. The net result of his inquiry, based on careful analysis of the various items of cost, was that approximately 6 cents represented cost of coal and ore handling at the two ends of the round trip, out of the 30 cents total. Detailed figures, doubtless may be obtained from Secretary Redfield.

(*e*) C. W. Hunt Co. (Inc.), manufacturers of coal-handling machinery at West New Brighton, N. Y., have furnished detailed estimates of cost of loading and unloading on and off barges at lake and river terminls, accompanied by blueprint sketches of various proposed types of loading and unloading plants suitable to the Lake Superior-Mississippi River canal-and-river project, as designed and prepared by Assistant Chief Engineer Fred E. Murphy, who rendered like service for this company in connection with the installation of the coal-handling plants of the General Government at the Isthmian Canal at Panama.

This company has furnished coal-handling machines for a large percentage of the United States Government and foreign Government coaling stations, as well as for harbors on the Great Lakes, including Duluth-Superior.

Exhibit 6 attached contains specifications and blue-print sketches of four different types and capacity of coal-handling plants recommended for use at various ports connected with the project.

Proposition 1 covers first cost and total operating cost of plant for unloading coal from lake barges and reloading into canal barge, with capacity of 500 tons per hour, 5,000 tons in 10-hour shift, and 800,000 tons in 160 ten-hour days; cost of handling per ton, including operating and fixed charges, 2.715 cents.

Proposition 2 covers a small coal-handling plant for unloading and conveyance to storage at river and canal ports. The $8,000 plant unloads from river barge at the rate of 50 tons an hour and conveys to storage a distance of 500 feet from the stream at a cost of 3.93 cents per ton, including operating and fixed charges.

Proposition 3 is planned for a larger unloading river terminal, such as might serve a city of the size of St. Paul or Minneapolis. It unloads at the rate of 750 tons an hour, or 1,200,000 tons for the season of open navigation, conveying the coal on a 30-foot trestle a distance of 1,200 feet inland at a total unloading and transfer cost, including all operating and fixed charges, of 2.91 cents per ton.

Proposition 4 covers a more complex plant of 500 tons per hour capacity, which unloads from boats, transfers to storage pile or to railroad cars, reclaims from storage pile, and reloads to cars or barges, at an unloading cost of 1.95 cents, at a transporting cost of 1.56 cents, and at a reclaiming cost of 2.87 cents, or, combining all of these various operations, which would be necessary in case of ultimate delivery of coal by rail, at a total of 6.38 cents, covering all operating and fixed charges.

As touching the point of damage to coal in handling, Engineer Murphy reports that the percentage of damage as handled by these plants will be very small, and that in the case of steam-boiler coal the breaking is of no disadvantage, because "it is necessary to crush run-of-mine coal before it can be economically fired by automatic stokers."

It will be noted in the above that the plant and cost of operation for transfer of coal from lake barge to canal barge, or unloading from river to dock, is much more simple and less expensive than in case of storage and transfer to railroad trains.

Applying plants 1 and 3 to Duluth-Minneapolis haul of 262 miles by canal and river, total charges are: Lake handling, 2.715 cents; haul, at 1.5 mills per ton-mile, 39.3 cents; unloading and delivery in storage 1,200 feet from river, 2.91 cents—total, 44.925 cents, against 90 cents to $1.25 by rail.

(*f*) The Brown Hoisting Machinery Co., manufacturers of coal and ore handling machinery, main works at Cleveland, Ohio, with New York, Pittsburgh, Chicago, and San Francisco branches, and among the leading companies installing coal and ore handling plants on the Great Lakes, including Duluth-Superior Harbor, submit catalogues and photographs of plants, and offer to furnish detailed data. The New York manager, in letter of October 23, 1913 (Exhibit 7), says of unloading cost:

"In reference to cost of unloading, this depends upon the circumstances under which the unloading is done; that is, whether the coal is simply brought to a bin on the edge of the dock or carried back to a stock pile. It also depends somewhat on the vessel, as to the size of the hatches and convenience of getting at the coal. We would say that this cost would be from 2 cents to 5 cents a ton, and in some cases may exceed this price of 5 cents."

Inasmuch as in unloading from lake boat into pocket at the edge of the deck for transfer by chute into canal boat at the foot of the pocket would entail the minimum of distance and labor of machine in transfer, whereas unloading for transfer to stock piles on shore and reloading upon trains entails a maximum of distance and labor of handling machinery, the cost of 2 cents per ton would likely apply to use of canal boat, while the 5 cents or over would apply to rail transportation.

(*g*) The McMyler Interstate Co., Cleveland, Ohio, manufacturers of ore and coal handling machinery, orange-peel, clamshell, and scraper buckets, car dumpers, and locomotive cranes; also one of leading manufacturers of such machinery at Great Lakes and ocean harbors, submit (see Exhibit 8) photograph and estimate of unloading cost for plant suitable for unloading from lake vessel to canal barge and from canal barge to dock at canal or river terminals, and state:

"We estimate that cost of unloading under these conditions should not exceed 2 cents per ton for labor, fuel, and repairs. This does not include interest on first cost of machinery and wharf."

If 1 cent per ton be added for fixed charge on plant, the total would reach 3 cents per ton, as against 25 cents arbitrarily used by local board.

(*h*) Mead-Morrison Manufacturing Co., New York, recognized as among leading corporations engaged in manufacture and installation of coal handling and hoisting machinery, submitted estimates (see Exhibit 9), catalogues, and photographs of plants installed by them at Duluth-Superior and other leading ports.

On the proposition of a large coal unloading and storage plant at Duluth-Superior, similar to those now installed for lake-to-rail transportation, with capacity of 1,000 tons per hour and 1,000,000 tons per season, and 500,000 tons storage capacity, total plant to cost $1,000,000—labor and fuel cost 3 cents per ton, and interest, depreciation, and repairs raise this to 7 to 12 cents, according to tonnage handled. The above approximates the cost involved in transportation by rail, without giving the railroad company dividends on capital outlay.

Similar cost per ton is estimated for plant with storage capacity at Minneapolis and St. Paul terminal.

Unloading from canal barge with $7,000 plant at river dock is estimated at 4 cents per ton.

(*i*) Link-belt Co., which has extensive manufacturing plants at Philadelphia, Chicago, and Indianapolis, and sales offices at 16 cities, of which Minneapolis, in proposed canal zone, is one, furnished catalogues descriptive of large variety of coal, coke, ore, cement, sand, and stone carriers, unloaders, tipples, and general link-belt conveyor machinery such as are used in mines, mills, power stations, and harbors throughout the country, including plants in operation in St. Paul, Minneapolis, and other cities in canal zone.

In informal conversation, New York manager estimated cost of handling at 3 to 5 cents for such conditions as those involved in unloading and loading coal and other bulk commodities at ports of Lake Superior-Mississippi River transportation project, with due increase in ultimate ton cost for extended conveyance through storage and manufacturing plants.

(*j*) New York Edison Power Co., said to be largest single consumer of coal in New York City, with annual consumption estimated at 750,000 tons, unloads coal from 500-ton river barge, hoists it to a height of 180 feet, crushes it for automatic stoker, weighs coal and conveys it by cable car to storage bins in upper floors of power station for gravity stoking, at a labor and power cost estimated by Chief Mechanical Engineer Grady of 2 cents per ton, and of about 4 cents including fixed charges.

Estimates of engineers for large power plants generally in New York approximate 3 cents per ton for operating cost and 4 to 5 cents including interest, depreciation, and repairs. These plants are necessarily more elaborate and expensive, both in first cost and in operating cost per ton, than plants required for loading and unloading canal and river boats on Lake Superior-Mississippi River project.

(*k*) Superintendent of ferries, city of New York. The department of docks and ferries for the municipality of New York has a coal-handling plant (see Exhibit 10) with 1-ton clamshell bucket which hoists coal from 600 and 800 ton barges a distance of 80 feet, weighs coal and discharges it into a pivoted bucket conveyor which travels 150 feet in distributing coal in bunkers. The plant is not operated on commercial basis, because the city demand of 65,000 tons for ferries requires use of plant for only partial capacity. The superintendent of ferries (Exhibit 10) estimates present handling cost at 5.3 cents per ton, which interest and depreciation on investment would increase to 8.4 cents. By operating plant at full eight-hour day, the superintendent estimates reduction of ton cost of handling to 4.1 cents.

(*l*) United States engineer office, Pittsburgh, Pa., furnishes the record for the lowest cost of coal handling from river barge or otherwise. In statement prepared by Asst. Engineer Thomas P. Roberts, who has for many years served as local engineer in charge of Locks and Dams Nos. 1 to 6 on Monongahela, including Pittsburgh Harbor, and herewith gives data (see Exhibit 3) supplied to the engineers office at Pittsburgh by companies handling coal from river barges at that point. Says Engineer Thomas (sec. 4 of Exhibit 3):

"We have on the Monongahela, in pool No. 1, a double ladder coal dredge unloading 500 tons per hour, raising it about 70 feet, and transferring the coal by an endless belt several hundred yards to the cars which distribute the coal to the coke ovens for a cost of one quarter of a cent per ton. This is only about one-twelfth the cost of simply raising the coal with a clam shell to the height of 70 feet."

Presumably this one-fourth cent covers cost of operation only, and does not include interest and depreciation. Subsequent data procured by Engineer Thomas

(see Exhibit 3) shows that the cost of the Monongahela plant named is $40,000, and that its capacity is 600 tons per hour. If we assume that interest, depreciation, and repairs on such plant would reach 15 per cent, or $6,000 a year, and that the plant runs at 500 tons capacity per hour, eight hours daily for 200 days in a year, handling 800,000 tons annually, the fixed charge would be three-fourths cent per ton, making 1 cent per ton as total cost of unloading from river barge, hoisting 70 feet, and transferring to coke ovens several hundred yards distant from stream.

There is little question that the Monongahela River and Pittsburgh Harbor, where coal handling has been specialized by long experience at the hands of large industrial companies, the rate of coal handling cost has been reduced to the minimum and is lower than can be expected at docks of proposed Lake Superior-Mississippi River lake and river terminals for many years. Handling cost of 3 to 5 cents per ton is, however, a reasonable average for which there is general consensus of authority; and on this basis the commercial feasibility of coal handling by canal and river on said project is amply assured, as compared with admitted cost by rail.

DATA SHOWING LOW COST OF COAL HANDLING AS GIVEN BY LOCAL BOARD.

38. Above data with reference to record low cost of coal handling from Monongahela River barge to coke ovens as contained in Exhibits 3 and 4 is forwarded to the Minnesota commission from the United States engineer's office at Pittsburgh.

Said local board also furnishes direct official data of cost of coal handling from boat to dock at Duluth-Superior Harbor in Appendix C of their report, being data contributed by J. A. Little, city statistician of the city of Superior, in the harbor of which the canal will have its northern terminus. This statement of fact by Mr. Little loses none of its force by reason of his position in trying to prove that West Virginia coal can not be profitably delivered in St. Paul via the Lakes.

By way of verification of Statistician Little's figures, to make certain that they are not the result of typographical error, I quote his calculation of cost from West Virginia mine to St. Paul, as follows:

"Mine cost 86 cents, plus transportation expenses of $2 through Superior to St. Paul, makes West Virginia coal worth $2.86 per ton, plus cost of handling at Superior-Duluth docks (3 cents ton boat to dock, plus 10 cents from dock to car), 13 cents would mean a total cost of $2.99 a ton at St. Paul."

So far as Mr. Little's theory is concerned, it is disproved by the actual tonnage of lake coal which has given the Twin Cities its chief fuel supply for years and is yearly increasing—the net increase being about 50 per cent in five years. But as regards the handling cost in question, Mr. Little's figures are vitally pertinent, not only because of the stated cost of 3 cents per ton from boat to dock, but by reason of the collateral fact, that the cost of handling from dock to car is 10 cents, making 13 cents as boat-to-rail cost, against 3 cents when the rail transfer is omitted.

DETERIORATION IN MARKET VALUE OF COAL INVOLVED IN ONE EXTRA HANDLING OF COAL BY CLAM SHELL OR OTHER LIKE MEANS.

39. The local board of engineers has assumed, from statements made to it by coal dealers at the head of the Lakes, that one extra handling of coal causes a deterioration in the market value of the coal of 25 cents per ton. No reliable authority or evidence of any tests is quoted to sustain such statement. Counsel for the Minnesota commission has made very extensive inquiry of the coal mining companies of West Virginia, Maryland, Pennsylvania, and of the United States Bureau of Mines and the department of mines of several States on this subject. The coal mining companies have not responded to the inquiries and have referred counsel to the president of the Northwestern Fuel Co. for the information in question. So far no information has been received through the coal mining companies or large dealers in coal.

From letters received from the United States Bureau of Mines it appears that there is no authority for the statement that deterioration amounts to 25 cents per ton or any given sum. Owing to the prominence that has been given to this charge we quote from the letters of the Bureau of Mines as follows:

"The bureau is not aware that any definite measurements have ever been made to determine the amount of deterioration in the market value due to handling bituminous coal between the eastern coal fields and the upper lake region. In fact, information on the deterioration of bituminous coal between mine and user is very meager.

"This is probably due to the difficulty and great expense in making an investigation of this sort. To give a proper reply would require that the coal in a large quantity, such as a cargo of 6,000 tons, should be followed from the face in the mine to the boiler room of the user, and at each new handling the whole product should be sized through screens and returned to its original mixed condition. This operation of screening the coal in order to find the relative proportions of each size would in itself damage the coal in a manner unusual in practice and would, therefore, give unreliable values for subsequent handlings. The coal is shoveled into cars at the face in the mine, is dumped from cars at the tipple, drops from the tipple into railroad cars, is handled from railroad cars into pier cars at the loading docks; from the pier cars it drops into coal pockets; from the coal pockets it drops into boats; from the boats it is reclaimed by buckets, dropped from buckets either into cars or stock piles; drops from stock piles into railroad cars; drops from railroad cars into local storage piles, is shoveled from local piles into boiler room cars, and is rehandled in the boiler room.

"This operation makes at least 12 handlings, and in some cases several more are added. It is rare that every one of these operations is conducted in the best possible manner to reduce breakage. In fact, the question of breakage in handling devices is by no means the first consideration. Any careful investigation of this subject, therefore, would require the handling of a great many tons both before and after each operation.

"Some such work has been done in some of the operations with hard coal which stands screening much better than soft coal, but even in this case the fine material is not returned to the original mass where it would have an effect on succeeding operations. Having separated our soft coal into the several sizes in order to determine the degradation of sizes, it would be extremely difficult to recombine the several amounts so that their effect on subsequent handlings would be normal.

"The problem is further complicated by the considerable difference in the strength between different coals, some coals standing considerable more abuse in handling than other coals. If the coal is stocked in piles through the winter at upper lake ports, the freezing and thawing adds another large and variable factor to the problem.

"Even if it were possible to express in figures the degradation in size, it would be yet more difficult to state what the deterioration in market value was. The mere fact that coal which starts from the mine as good lump coal finally reaches its destination with a considerable portion of fine material in it, would not warrant the buyer in assuming that the value of the fine stuff was that of slack. Slack coal at the mine contains a larger per cent of ash and impurities than the lump coal, while the fine stuff made from the breakage of lump coal has a heating value equal to the original lump coal. Whether this heating value can be efficiently realized in practice depends entirely upon the equipment of the boiler plant where it is used; that is to say, if all plants at upper lake ports were equipped to efficiently use fine crushed bituminous coal, such as is used in many stoker equipments, there would be no deterioration in the market value due to breakage of the coal in transit.

"Very truly, yours,

"J. A. HOLMES, *Director.*"

"The bureau is unable to furnish any information on the subject of deterioration of coal in handling other than that contained in its letter of March 11.

"It may be pointed out that coal as usually handled has passed through some 12 or more operations, and if each of these operations reduced the value of the coal 25 cents per ton it is readily seen that the price at destination would be something less than nothing. It is hardly to be supposed, therefore, that the addition of one more handling from lake bottom into coal barges would deteriorate the value as much as 25 cents per ton."

A great deal of light is thrown upon this question by the report of the Ohio Coal Commission to the governor of the State of Ohio, dated December 17, 1913. One of the main questions considered by that commission was the question of whether miners of the State of Ohio should be paid on the "mine run system"

or whether the system of paying miners for the amount of coal which would pass over 1¼-inch screen should be continued. In the consideration of that question the commission made investigations and took testimony, not only at the mines and as to the conditions of mining but as to the operations involved in the handling of coal from the face of the mine to the consumer, and among other things took testimony of expert coal men familiar with conditions at the head of the Lakes and entire Northwest with reference to lump coal, slack, and the conditions which produced slack or fine coal. If the board will read pages 43 to 60 of the report of the Ohio commission, it will inevitably conclude that if the coal is properly mined in the first instance, that is, if it is not "overshot" but is undercut by machinery and shot with a proper charge of powder, the liability of the breakage of the coal in handling is reduced to a minimum; but any of the Ohio, Pennsylvania, or West Virginia coal which is overshot or blasted with too heavy a charge of powder will produce a large percentage of slack in the various handling operations to which it is necessarily subject in being taken from the mine to the consumer.

It appears from the report of the local board, as well as from the testimony taken by the Ohio commission, that when the coal is received at the docks at Duluth-Superior it is screened before being stored or shipped by car, and in all probability the 25 cent per ton deterioration mentioned in the report of the local board is the deterioration due to the entire process of carrying the coal from the face of the mine to the dock, involving, as it does, from a half a dozen to 10 handling operations. There is nothing in the report of the local board or any of the evidence or statements received by the board which indicates that the one extra handling involved in transportation of coal by canal barge, which handling occurs before the coal is screened, should have any more effect on the deterioration of the coal than any one of the other handlings of the coal necessarily involved in transporting the coal from the mine to consumer. The conclusion seems to be inevitable that the assumed deterioration does not exist and that the deterioration, if any, is so slight as to be commercially negligible and is fully offset by box-car transportation from Duluth to the Twin Cities.

COAL PRINCIPAL COMMODITY OF WATERWAYS AND CANAL.

40. In the United States and Europe coal is one of the principal commodities transported on canals and waterways. On page 532 of the final report of the National Waterways Commission it is said:

"The foregoing analysis of the traffic carried on the principal waterways of Europe and the United States reveals the fact that a few bulky commodities form the great share of the tonnage. Among these, coal is the most conspicuous. In many cases it furnishes more than 50 per cent of the total traffic, and sometimes as high as 90 or 95 per cent. The cases are rare on the principal waterways where coal is not the largest single item carried."

Water rates on coal are usually the lowest of any commodity. We quote from the above authority on page 556:

"The average charge for the transportation of coal on the Rhine from Ruhrort to Mannheim, a distance of about 220 miles by water, for the nine-year period 1901–1909, was 27.6 cents per metric ton. The lowest charge recorded during this period was 13.1 cents, which was made on a few consignments in 1908, and the highest charge was 58.8 cents, which was reached in the same year. The average yearly rate on this coal traffic was lowest in 1909, when it reached 18.3 cents per metric ton. This was due to a large increase in the number of boats competing for the traffic, which more than offset the considerable increase in the traffic itself.

"The following table shows the average rates recorded for carrying coal during the last decade from the mouth of the Ruhr to Mannheim:

Year.	Rate per ton.		Year.	Rate per ton.	
	Marks.	Cents.		Marks.	Cents.
1901	1.05	24.9	1906	1.45	34.5
1902	1.00	23.8	1907	1.61	38.3
1903	1.18	28.1	1908	1.10	26.1
1904	1.23	29.2	1909	.77	18.3
1905	1.08	25.7			

The above figures are for metric tons of 2,240 pounds. Reduced to a ton-mile basis they are as follows:

Per ton.	Per metric ton-mile.	Per ton-mile (2,000 pounds).
Cents.	*Mills.*	*Mills.*
27.6	1.25	1.23
13.1	.059	.053
24.9	1.13	1.11
18.3	.083	.074
23.8	1.08	1.07
28.1	1.27	1.25
29.2	1.32	1.30
25.7	1.16	1.14

TRAFFIC FINDING A: CANAL WILL CARRY COAL.

41. Coal takes a transportation rate 25 per cent less than average freight tonnage. Accepting Erie Canal standard of 2 mills per ton-mile as average freight, the coal rate should be 1.5 mills per ton-mile. Coal has actually been carried on Erie and Hudson 500 miles between New York and Buffalo, and that in 240-ton canal boats sometimes carrying only 160 tons per load, according to testimony of booking agencies, at 45 cents for trip, or nine-tenths of 1 mill per ton-mile. On Monongahela, Allegheny, Kanawha, and Ohio the average rate in 500-ton barges appears to be not much over 1 mill per ton-mile. The rate on the Alabama project is two-fifths mill per ton-mile. To assume as a coal rate on Lake Superior-Mississippi River waterway by use of 550-ton barges 1.5 mills per ton-mile would therefore appear reasonable in light of practical experience on above-named 6-foot navigable waterways.

Transfer from lake barge to canal barge via pocket bins—upper mouth of pocket being at edge of deck of lake vessel, and foot of pocket terminating in retarding chute which loads canal barges—affords the cheapest and simplest method conceivable of unloading lake vessel, and should cost, on basis of Pittsburgh and Great Lakes experience, not over 2 to 3 cents per ton. Lake vessels need not wait for canal barges but unload into pockets at pleasure and at all hours of day, canal barges being likewise independent of movement of lake vessels, except that canal barges must relieve harbor pockets within a reasonable number of hours.

Unloading at river terminals probably can not be accomplished at 1 cent per ton rate achieved at Pittsburgh, but may reasonably approximate 3 cents, which should convey coal to cable line or storage bunker several hundred feet from river bank.

This will make cost of transportation by canal and river 250 miles from Duluth to Minneapolis, taking from lake barge and delivering in Minneapolis storage near river front, at approximately 45 cents per ton for transportation and handling at both ends of route. One authority, Mr. Bernhard, reduces this to 25 cents per ton.

As against 90 cents by rail on soft coal the saving by waterway would be at least 45 cents per ton, and as against $1.25 by rail on hard coal the saving would reach at least 80 cents per ton.

Compared with Illinois rail rates of $1.40 to $2.10 from mines or from Chicago to Twin Cities, the Duluth-Superior coal moved by canal and river would have the superiority of 95 cents to $1.65 in transportation cost, besides the marked superiority in grade of lake coal.

Present consumption of Minneapolis, St. Paul, Minnesota Transfer, and South St. Paul approximates from 2,500,000 to 3,000,000 tons. Other canal and river cities and counties in western Wisconsin and in eastern, central, and southern Minnesota will consume and distribute to country tributary at least 1,500,000 tons additional, making present coal total for canal zone and territory tributary to Mississippi River distributing centers about 4,000,000 tons. Increased coal demand of territory and coal capacity of Duluth-Superior Harbor during estimated four-year period of building canal will expand coal tonnage available to upper Mississippi via Lakes to not less than 5,000,000 tons. Allowing railroads to haul from Duluth-Superior all of their present tonnage, with some annual increase, there will still be upward of 2,000,000 tons available to canal-and-river

barges, at a saving of 45 to 80 cents on lake-and-rail rates, and much more than that margin as compared with all-rail rates from Chicago and Illinois mines.

If the average ton saving on the total 2,000,000 tons carried by waterway is 50 cents per ton, the total amount saved in hauling coal is $1,000,000 per annum, which is $580,000 more than the $420,000 required by the local board of engineers to demonstrate the commercial feasibility of the project.

TRAFFIC FINDING B: CANAL WILL CARRY STEEL, CEMENT, AND MERCHANDISE.

42. Investment of an ultimate total of $25,000,000 in model steel, blast furnace, coking, and cement industry by United States Steel Corporation at Duluth is for the evident supply of the upper Mississippi Valley and westward territory by that company of its various productions. Its Gary and South Chicago plants take care of the Middle West and the lower Mississippi Valley, which leaves Minnesota, western Wisconsin, the Dakotas, and northern Iowa and Nebraska to be taken care of by the Duluth plant. Over one-half of the proposed 48 mills, ovens, furnaces, and auxiliary buildings are now approximately completed, and foundations are laid for the remainder, upon which a large force of mechanics are putting up the superstructures and installing machinery. The furnaces are ready for business, and a year will find the plant at least in partial operation.

Slag containing lime refuse from the furnaces is converted into cement. The furnaces and cement works require large quantities of limestone, of which the limestone formations through which the upper Mississippi and lower St. Croix makes channels have an abundant supply.

Annual tonnage of the Minnesota Steel Co. works at Duluth can only be roughly estimated at this time. It is conservative to say that the rail mills, merchant mills, structural steel mills, furnaces, and rolling mills will ship 500,000 tons of their products per annum into the Mississippi Valley; probably 1,000,000 tons may eventually be the annual shipment. Duluth works will supply the various manufacturing subsidiaries of the Steel Corporation, such as the American Bridge Co. at Minneapolis and St. Paul, with structural steel, and other down-river points. The American Bridge Co. is likewise a builder of river barges and steel tow vessels, and will undoubtedly be in the market for canal and river equipment generally.

As a builder of river and canal barges, it is natural that the Steel Corporation should use such equipment for its transportation purposes, as the company is doing both on the Monongahela and the Great Lakes. The Steel Corporation owns a fleet of 114 of the largest carriers on the Lakes and is using its own barges on the Monongahela and Ohio for handling its coal, iron, and steel. Along its 2 miles of water front on Duluth-Superior Harbor it is now building additional docks, and these could well serve to load canal and river boats for transportation of products through proposed canal link into the Mississippi.

It is therefore fairly reasonable to suppose that Duluth-Superior will ship via the canal a tonnage of 500,000 or more of steel and cement.

GENERAL MERCHANDISE.

The purpose of New York City, through the New York Produce Exchange and Chamber of Commerce, representing the merchants, manufacturers, grain and produce interests of that metropolis, in supporting the measure for a $130,000,000 Erie Barge Canal and public terminals, is:

First, to secure and hold for New York Harbor the grain, flour, and general produce of the Northwest, including the upper Mississippi Valley and Lake Superior region.

Second, to furnish the Erie Canal barge fleets with return cargoes of general merchandise from New York and the Atlantic coast, including foreign imports.

There is no question of the power of a largely improved and efficiently administered Erie Barge Canal with well equipped public terminals to develop a channel of commerce with the Great Lakes region. That is shown by the former achievements of the old Erie Canal, to which is attributed much of the vantage ground of New York Harbor over Boston and Philadelphia in the race for position of chief emporium of the Atlantic coast.

As the largest share of the grain, flour, and general farm produce which New York invites will come from Duluth-Superior, the outlet of the agricultural shipments of Minnesota, North and South Dakota, and northern Iowa and Ne-

braska, it is inevitable that the return cargoes of merchandise will seek Duluth-Superior Harbor for transshipment into the upper Mississippi Valley.

As shown by Exhibit 12 attached hereto, canal-and-lake rates over the Anchor Line from New York to Duluth-Superior, even with the present neglected equipment on the Erie, are about 25 per cent under the lake-and-rail rates. New York Canal authorities report that the new 2,000 and 3,000 ton barges on the enlarged Erie Canal will reduce the average ton-mile rate from the present 2 mills to one-half mill per ton-mile. This marked reduction in transportation cost is bound to have its influence on volume of commerce handling. It means largely increased tonnage for Duluth-Superior Harbor.

Moreover, American grain will soon cease to be exported to Europe, because the American production is required for American consumption. That means that the grain and flour now going to Montreal for export will go to the chief centers of domestic consumption, and as it takes the Great Lakes route for cheap transit this tonnage will naturally proceed via the new Erie Barge Canal to New York for eastern distribution.

The result is the development via the lakes and canal of an extensive waterway commerce between New York Harbor and Duluth-Superior; and hence a substantial merchandise tonnage via the Lake Superior-Mississippi River Canal with the upper Mississippi Valley.

Such heavy commodities as salt, sugar, cement, iron and steel, machinery, and likewise such staples as heavy cotton goods for Twin City manufacture into farm, mill, mine, and lumber clothing supplies, which now take the Great Lake route, will use the proposed canal-and-river line in largely increased volume. The New York through westbound merchandise tonnage plus that developed by the big steel plant at Duluth should give the canal by the time it is finished an aggregate available freight of 1,000,000 tons.

ECONOMIES ON THROUGH WESTBOUND AND LAKE SOUTHBOUND TONNAGE.

43. On through westbound merchandise from New York Harbor via Erie Barge Canal, Great Lakes, and Lake Superior-Mississippi River Canal, there will be the following economies in cost of transportation and freight handling:

(*a*) Public terminals and freight handling machinery provided by the State of New York, now being designed and installed, will reduce present rail terminal charges of 25 to 50 cents per ton at New York to actual cost of handling from dock to barge of about 3 cents per ton.

(*b*) Rail to lake rate of about 7 mills per ton-mile on carload lots from New York to Buffalo will be reduced by new Erie Barge Canal to less than 1 mill per ton-mile.

(*c*) Freight handling of such merchandise at Duluth-Superior which costs through rail terminals 25 to 35 cents can be transferred from lake vessel to canal barge via modern terminal plant suitable to dock practice at 3 to 6 cents per ton.

(*d*) Transportation via canal and river to river terminals on Mississippi will be at 2 mills per ton-mile, compared with rail rate of 6 mills or more.

(*e*) Delivery of freight from barge to dock and terminal warehouse at Minneapolis, St. Paul, and other river points can be made with modern gantry, telpher, and other freight-handling machinery at 3 to 6 cents per ton, according to distance of carriage and mode of storage; in lieu of the rail terminal cost 25 cents and upward.

The above economies are not net, because the rail rate may include part of the terminal costs. The differences in actual cost to carriers, however, are taxed upon the consumer in one or another method in the end. Conversely, economies in actual cost of transportation and handling redound to the benefit of the consumer in the final analysis. Reductions in such cost by water route enable the waterway to secure and hold traffic. Restricting the saving by canal to 42 cents per ton as follows—52 cents for Duluth-Minneapolis haul at 2 mills per ton-mile, plus 4 cents handling charges at lake and 4 cents at river dock, total water line, 60 cents, compared with rail average of $1.02—would net on 1,000,000 tons the necessary $420,000 estimated by engineers as justifying the project.

TRAFFIC FINDING C: CANAL WILL CARRY EASTBOUND FLOUR.

44. Through merchandise from Great Lakes route and tonnage originating in Duluth-Superior Harbor, other than coal, will move on the canal and river in decked barges suitable for return eastbound cargoes of flour.

Merchants and millers at Minneapolis, St. Paul, South St. Paul, Stillwater, Hastings, Red Wing and Winona may unite, as have those at Kansas City, in the organization of a canal-and-river navigation company for the operation and handling of their own freight line. In that case, barges coming from the lakes with merchandise would return to lakes with flour eastbound.

Minneapolis now produces 18,000,000 barrels of flour, which is more than that of any other milling center in the world. This flour production will annually increase; by 1918 it will be 20,000,000 barrels. Other mills in canal and river territory will swell the total to somewhere near 30,000,000 barrels, of 3,000,000 tons. Via the river, the canal link, the Lakes and the Erie Barge Canal and New York public terminals, this flour tonnage can go to New York Harbor at much less than the rail rate to Chicago, and at less than one-half the all-rail rate to Atlantic.

The local board of engineers apprehended that to deliver this flour from mill to river barge would entail a terminal rail handling cost of 35 cents per ton, which would practically wipe out the margin of reduced cost of water transportation to the lake. However, it appears that such terminal rail handling is unnecessary.

The American Steel & Wire Co., which at the Trenton Iron Works manufactures air cable lines, or aerial tramways, under German patents, furnishes specifications (see Exhibit 13) for a cable plant that will take the flour from the Minneapolis mills on the river banks, carry it down river a half mile or more and deposit it in a barge at a cost of 3.6 cents per ton, including all operating and fixed charges.

About 4,000 of such plants are now in successful operation, engaged to handle similar situations, where engineering difficulties and rail costs are prohibitive by ordinary transportation methods. One of such plants has been in successful operation between the mill and elevator of one of the big milling companies of Minneapolis for several years.

At Duluth-Superior Harbor a belt conveyor will transfer the flour from canal barge to lake vessel at similar cost.

Allowing 4 cents for loading and unloading by modern machinery at river and the same at the lake, or 8 cents, plus 2 mills per ton-mile Minneapolis to Duluth-Superior, 52 cents makes 60 cents by barge compared with average $1.02 by box car, a saving of 42 cents per ton. This economy applied to 1,000,000 tons of flour, being only one-third of the total flour tonnage, would produce the total $420,000 economy necessary to justify the project.

TRAFFIC FINDING D: CANAL WILL CARRY NORTH AND EAST BOUND GRAIN.

45. Grain from Duluth-Superior Harbor goes by lake to Montreal and is loaded on ocean vessels by floating elevators at a total of 4½ cents per bushel from Minnesota and Wisconsin harbor to ocean liner.

The New York Produce Exchange is preparing to duplicate this charge via Erie Barge Canal. Harbor-loading charge on ocean vessel in New York is now one-half cent per bushel.

From Minneapolis and other primary and local grain markets to Duluth-Superior wheat moves at 3 cents per bushel, or $1 per ton, by rail, as compared with one-half that ton-mile rate in 240-ton barges on the old Erie Canal—a saving of 50 cents a ton.

Surplus grain in Minneapolis, St. Paul, Stillwater, Red Wing, and Winona elevators, over and above local milling demands, with similar elevator charges by rail and water, will take by preference the 50-cent water rate, as compared with $1 rail rate.

Elevators will adapt their locations and terminal arrangements, so far as new plants are concerned for additional tonnage, to waterway transportation; and in the absence of such changes by line elevator companies, cooperative farmers' elevators will take advantage of the low transportation cost by water to handle their products, as now frequently occurs even along the railroads.

At river points where elevators are not available grain will flow by chute or move in cable buckets from overhead tracks to barge at 2 to 5 cents per ton.

Floating elevators or belt-line conveyors will transfer grain from barge to lake vessel at materially less than the usual elevator charge.

Local board of engineers fears that Chicago rail route may get coarse grain in Minnesota and western Wisconsin, even on a rail charge of $2.50 per ton from La Crosse to Chicago. Their difficulty lies (1) in loading the water route with 44.4 cents per ton loading charge at La Crosse and 44.4 cents more for unloading at Duluth-Superior, and (2) in hauling the grain around from Lake Superior through Lake Michigan to Chicago (a route it would not take), when the same cost of lake transportation would deliver it in Erie barges at Buffalo, destined to New York, where it is worth 6 to 8 cents per bushel, or $2.50 to $3 per ton, more than it is at Chicago.

Granting that all grain raised north and west of a straight line from southwestern Minnesota to Duluth and tributary to said line would take the through rail route to Duluth, there remain a large group of Minnesota counties in eastern, central, and southern Minnesota, besides a double tier of western Wisconsin river and canal counties, and likewise a further group of grain-producing counties in northern and northeastern Iowa. The total grain production of this region approximates 240,000,000 bushels. Assume that two-thirds of this total product of wheat, corn, oats, rye, flax, buckwheat, and barley is required for home, mill, and live-stock consumption, there remain, reduced to tons, 2,000,000 of surplus grain tonnage for river and lake, or for Chicago rail shipment. This grain is either tributary to the Mississippi or must cross that stream to get to Chicago. The central point of this tonnage territory where it crosses the river is about equidistant, say 300 miles, from both Chicago and Duluth-Superior.

The engineers give $2.50 per ton as the rail charge to Chicago.

The Erie rate of 2 mills per ton-mile for 300 miles is 60 cents.

Will the grain go via Duluth-Superior and the lakes to New York, where it can make the entire water trip to New York Harbor for a ton rate equal to the rail rate to Chicago, or will it go to Chicago and be worth to the shipper 6 to 8 cents per bushel less than it is in New York?

Even granting that the water route entails two transfer charges of one-half cent per bushel at each transfer, the advantage to the shipper is 5 cents per bushel in favor of the water route.

If the river divided this surplus tonnage with the rail route, the margin of saving on 1,000,000 tons would alone more than produce the $420,000 a year necessary to demonstrate the commercial feasibility of the river and canal improvement.

TRAFFIC FINDING E: CANAL WILL CARRY NORTHBOUND COMMODITIES.

46. Besides grain and flour, the river and canal will carry sundry northbound commodities from Mississippi Valley to Great Lakes:

Limestone from limestone ledges which form river banks of upper Mississippi and St. Croix.

Building stone from stone quarries that will develop among the hills bounding the St. Croix.

Brick from numerous brickyards on St. Croix and upper Mississippi.

Tile from Red Wing and other tile works on rivers for drainage of swamp sections on upper Wisconsin and Minnesota Rivers and in lowlands suitable for truck farming.

Commercial fertilizers from South St. Paul packing houses, which will find its best market in market-gardening districts of lower lakes and in New York and New England.

Oil cake from the Twin City linseed oil mills for export and for eastern consumption, the Twin Cities being the leading linseed oil and cake manufacturing district of the world.

Potatoes from sandy farm-land section of eastern Minnesota and western Wisconsin for Great Lakes and Duluth-Superior steel mill and iron mine districts.

Bran, shorts, and general mill feed for Ontario, lower lakes, and eastern dairy regions.

Hay from meadow sections of St. Croix Valley, baled for Great Lakes cities and for dairy and live-stock districts.

Agricultural implements from Minneapolis-St. Paul implement houses, which carry the largest implement business of any distributing center in the world.

Binder twine and farm machinery from Minnesota State Prison at Stillwater, which is one of the largest plants in that line of goods and operated by the State to give farming sections low-priced and reliable wares.

Hardwood and pulp-wood lumber from St. Croix wooded region for eastern consumption.

These staple commodities in the aggregate will make a heavy and dependable tonnage local to the river and canal and a little subject to general rail competition over the route from origin to destination of the respective shipments. There should never be less than 1,000,000 tons per annum in the aggregate of these commodities available to the river and canal route. Development of the waterway will in itself develop these industries.

These miscellaneous heavy commodities will furnish return cargoes to the lake for the open coal barges which will supply the Twin Cities and all other upper Mississippi manufacturing and large population centers with fuel; cheaper coal will stimulate manufacturing enterprises, resulting in increased commerce. This tonnage gives the Lake Superior-Mississippi River project a marked advantage over the Monongahela and Allegheny, which have no return cargoes for their coal boats. As a consequence, transportation cost on these Pennsylvania coal-carrying streams has to include the round trip with return of empties, with no earnings for the return voyage, whereas the Lake Superior-Mississippi barges will have revenue freight both ways.

With coal barges southbound from lake and above-named commodities for northbound fleets an average of 1.5 mills per ton-mile will be assured each way, as compared with 6 to 7 mills by rail. A saving of 4 to 5 mills per ton-mile on an average 200-mile haul on 1,000,000 tons would insure the commercial feasibility of the project from every point of view, regardless of all other classes of tonnage available.

TRAFFIC FINDING F: CANAL WILL CARRY THROUGH COMMERCE LAKES TO GULF AND NORTH AND SOUTH AND VIA PANAMA.

47. Because of diversity of climate, seasons, people, and productions, nature and the laws of supply and demand intended commerce between North and South, between North Temperate Zone and Tropics. A century of slavery followed by a half century of sectional feeling and race prejudice, made bitter by Civil War, interrupted that law of trade for generations in this country. That period is now past. Commerce will now return to its own in the revival of trade relations between the great empire tributary to the Gulf and the equally vast industrial empire of the Great Lakes region.

All that is required is the development of the necessary channels of commerce and routes of transportation. The General Government has started upon the revival of this commerce by appropriating something like $60,000,000 in the aggregate for a permanent and reliable channel of navigation from Minneapolis to the Gulf of Mexico. But through commerce into the Great Lakes, which carry the greatest tonnage in the greatest merchant fleet floating the American flag, is necessary to put the great arteries of North and South commerce into complete and normal circulation. Commerce does not flourish on dead ends of trade channels. Trade circulation begins when the dead ends are punched through to complete the circulatory system. When Lake and Gulf meet, then true commerce between North and South begins in earnest, and the barges of the great Mississippi will carry full cargoes.

Of a total of 90,000,000 tons of Great Lakes commercial freight, 72,000,000 tons, or 80 per cent, passes through the Soo canals to or from Lake Superior.

This demonstrates that the logical destination of a Lakes-to-the-Gulf through waterway is a link joining the Mississippi River with Lake Superior.

The St. Croix River is the direct north and south tributary of the Mississippi and rises within 20 miles of Lake Superior. It therefore affords the natural channel of canalization between lake and river. This is the route declared by United States engineers as most feasible for uniting the greatest river of our continent with the greatest lake.

No one can estimate in advance what tonnage will develop in a revival of commerce between North and South, between Lakes and Gulf, between the Mississippi Valley and the Pacific via the Panama Canal. It is a matter which future development only can determine. The same is true, however, in regard to the tonnage which will pass the Panama Canal. Foresight and faith are the basis for such enterprises. Faith in the development which should follow the linking of Atlantic and Pacific has caused this country to venture on an

investment of $375,000,000. The linking of Lakes and Gulf by the Lake Superior-Mississippi Canal involves the comparatively light investment of $8,000,000. Were there no other considerations and benefits to accrue, the opening of a north and south channel of commerce through the center of the United States, bringing together in one system the commerce of the Great Lakes and the commerce of the Gulf and Pacific, alone justifies the small investment necessary as shown by the estimates of three preliminary examinations and surveys by United States engineers. Germany, France, Austria-Hungary, or any other European industrial and commercial power would not hesitate to invest many times that sum to insure such a vital and important national development.

BENEFITS TO COOPERATING RAILROADS.

48. It is safe to say that every enterprise which develops industry and commerce, which builds up farming settlements and cities, which makes undeveloped natural resources contribute to commerce and the support of population, directly or indirectly benefits the railroad. If the railroad loses the handling of one shipment, it makes up by being supplied with two other shipments. If it loses the haul of a car of coal or stone because that load can be more economically hauled by water, it makes double profit by having the haul of an increased volume of higher class merchandise at higher rates and with greater speed of transit, and a larger margin of profit in handling.

Then it is patent that the river and canal reach along their shores undeveloped or poorly developed resources, industries, and towns which the railroad can not profitably or has not been able profitably to reach and develop. The river and canal can do this work far more conveniently and economically than the railroad. The business developed becomes revenue freight at some stage of its route for the railroad; and the town, industries, resources, and commerce developed add directly or indirectly in the final result to the earnings of rail transportation.

Again, whatever works to the maximum efficiency and economy of industrial and commercial operation works in the end to the mutual and reciprocal benefit of all factors involved, and, as one of the chief factors in the general system of industrial and commercial organizations, the railroad is a joint beneficiary with all.

For example, take the comparative rail and water terminal investment, fixed charge, and operating cost. Byers finds that the interest and depreciation on 38 leading freight terminals in the United States produces an average fixed charge of 28 cents per ton on each ton of merchandise handled at those terminals. When the river and lake harbor can operate on a fixed charge of 1 to 3 cents per ton for the classes of heavy freight which the barge fleet handles, is not the railroad, as well as the rest of humanity, better off to let the barge handle that freight, and for the railroad to handle other higher class freight in which the fixed charge for terminal handling would be a minor item?

The railroads of Europe have found development and progress in the cooperative activity of waterway and railway. They obtain higher average rates in handling higher average classes of tonnage. Leading railway authority in this country has arrived at the same view. Therefore, in carrying forward this project to completion, the basis should be the benefits to be achieved through rail and water cooperatioin, rather than to count on rail and water friction and hostility, to the detriment of all concerned.

CONCLUSION.

A. The project is justified by the reduction it will effect in freight rates. The reduction of the rail rate of 6 mills and more per ton-mile to 1.5 or 2 mills per ton-mile on the tonnage available to the project reimburses the United States many times over for its investment. This transportation rate economy does not cease at the canal, lake, and river dock, but has its general effect on transportation rates generally through an extensive territory even remote from the waterways.

B. The project is justified because of the effect which the addition of 250 miles of transportation facilities will have in developing commerce and industry. Here, again, the benefits are not merely local, but extend through a great commercial and industrial area which is in many directions made a common beneficiary.

C. The project is justified by the tonnage of coal, flour, grain, general merchandise, and large volume of miscellaneous commodities which it will handle to the mutual benefit of the labor and capital employed in the industries and to the common good of both the local and distant consumer who receives the products at a reduced cost of living.

D. The project is justified as a link in a channel of commerce between the Government Mississippi River project of improvement in which nearly $150,000,000 of the Nation's revenues are invested, and the Great Lakes project of navigation in which it is estimated that for improvement and operation and maintenance to date the nation has an aggregate investment of $100,000,000; this proposed $8,000,000 connecting link adding to the efficiency and carrying out the main purpose of both in creating a national system of waterway transportation and commerce.

E. The project is justified as a necessary national link in a system of commerce between Mississippi Valley and Atlantic, and again between Great Lakes, Gulf, and Pacific; and that, through the industrial heart of the Nation, where it can be of maximum service to the people and their industrial and commercial activities.

F. The project is justified as the chief effective way by which the Lake Superior region and upper Mississippi Valley may realize their direct share in the Panama Canal improvement for development of commerce.

G. The project is financially justified as a Government investment by the additional increment of Federal revenus it will produce. From Minnesota and Wisconsin the Federal Government will collect an aggregate of $20,000,000 to $25,000,000 annually as their proportional contribution of internal revenue, customs tariff duties, income taxes, and miscellaneous revenues. Additional transportation facilities developing industries and commerce, increasing property values and earnings, and thereby increasing the income, purchase power, and consumption of the people, increases these Federal revenues. If this commercial and industrial enterprise through development of waterway transportation increases the Federal revenues from the States of Minnesota and Wisconsin only 2 per cent per annum, it pays the annual $420,000 estimated by United States engineers for cost of operation, maintenance, and 3½ per cent interest on investment.

FUTURE GOVERNMENT AND STATE CANAL WILL BE AMPLY PROTECTED FROM RAILWAY BOYCOTTING AND RAILWAYS WILL BE COMPELLED TO EXCHANGE TRAFFIC WITH WATERWAYS ON FAIR TERMS.

Current history clearly foreshadows the end of the monopolistic methods railway combinations have used in the past in crushing canal and waterway competition. Federal and State Governments will no longer tolerate such practices.

In Panama Canal legislation Congress has indicated its policy by providing against railway ownership of vessels in competition with such railways. This was done because otherwise railway owned boats would monopolize coastwise traffic passing through the canal. The opening of the Panama Canal, where $375,000,000 of public money has been spent, creating as it will new currents of commerce affecting the trade of every section of the United States and the world, will keep the attention of the Nation focused upon waterway development and upon every attempt to strangle or destroy it. This interest will be intensified by the completion and opening of the new Erie Canal in 1915, where the people of the State of New York not only have expended more than $100,000,000 in the construction of the canal but, realizing that the old Erie Canal failed in part because the competing railways had purchased and gained control of the terminals, appropriated $19,000,000 for the purchase of adequate terminals and terminal facilities therefor.

In addition to this a traffic department for the new Erie will be provided, the State will control the terminal charges and will control and require physical connections to be made between the canal and all of the railroads tributary thereto, facilitating exchange of freight between water and rail. The canal authorities and public service commission of the State will also control the making of joint rates for canal and rail traffic and the State is otherwise prepared to protect water traffic on the new Erie. It is estimated by Government engineers that the new Erie will carry 15,000,000 tons of freight annually.

Is it conceivable that in the atmosphere created by the opening of these two great canal projects a canal project such as the one under consideration from Lake Superior to the Mississippi River can or will be controlled or dominated

by railways? Is it possible under such conditions that the States of Minnesota and Wisconsin and the United States Government, warned as they now are by the examples of railway hostility, domination, and control of the canals and waterways of Europe and the United States in the past, will not take full and adequate measures to protect this canal and by such measures absolutely prevent the evils of railway boycotting and domination so fully reported upon by the authorities quoted herein? The States of Minnesota and Wisconsin will provide adequate terminals with the most modern terminal facilities; they will require physical connection by all of the railways tributary to the canal; they will provide the necessary legislation for requiring the making of reasonable and fair joint through rates and for the equitable division thereof between canal and rail carriers so far as intrastate business is concerned, and there is no doubt but that Congress will provide the necessary legislation therefor so far as interstate commerce is concerned.

The public demand for relief from two great economic evils is ever increasing.

First, the demand for lower rates of transportation.

Second, the demand which amounts to a great economic necessity that the ever present menace of railway congestion and consequent enormous loss to countless thousands of people of the Nation be allayed by such a great increase in the facilities of transportation as can only be provided by canals and waterways.

Transportation authorities agree that in recent years the movement of traffic had increased entirely out of proportion to the increase in transportation facilities. During the period of 1900 to 1910 railway mileage increased 35.9 per cent, while the increase in freight ton mileage was 80 per cent. It is said by the National Waterways Commission that with the next period of expansion there is a strong probability of worse congestion of traffic than ever occurred before. Congestion of traffic acts upon commercial life exactly as a financial panic, only the loss, damage and wreckage are perhaps greater, more material and more lasting in their effects. The Nation has sought and we hope found relief from currency panics in the reserve bank system. It now seeks relief from commercial congestion, stagnation and consequent enormous losses in provisions for additional transportation by means of waterway improvements and canal extensions. The building of this important canal project is therefore of the utmost importance.

If this project is not commercially feasible because of the conditions found to exist by the local board with reference to railway control and domination of water traffic, resulting in failure of waterways to obtain and hold their fair share of freight and which will, in the opinion of the local board, prevent this canal from obtaining traffic, then it logically follows that no further appropriations should be made by Congress for the improvement of any inland canal or waterway. All reports and findings of commissions, committees of Congress and observations of students of transportation are to the effect that the same conditions as to railway control, etc., found by the local board to exist, are also found to exist and operate with reference to every canal and waterway of the Nation. What is the logic that justifies the improvement of the Mississippi River, the Missouri River, the canals connecting New Orleans with the Alabama coal fields, the Ohio River, when history shows that each of these waterways is in the same condition with reference to railway competition and domination as stated by the local board to exist with reference to the projected canal?

It is the experience of the nations of continental Europe that unless restrained by government railways could and would destroy water traffic. They did so until the governments concerned protected waterways from the unfair competition of railways. What has been done to protect waterways in those countries can and will be done in the United States. But there is no middle ground. Either we must confess that our policy of waterway improvements is a failure because of railway superiority or unfair competition and abandon the entire field of transportation to the railways and cease making appropriations for waterway improvements, or we must continue to improve our waterways, trusting to Congress and the States concerned to enact the necessary legislation to protect the public investments in such waterways.

Finally, we desire to add that the report of the local board should not be concurred in, but the same should be modified or set aside and the project recommended as commercially feasible. That if the general board shall deem it advisable to recommend the proposed canal upon condition that the localities and States interested provide proper terminals and terminal facilities open to all upon equal terms, subject to public control and free from railway or other monopolistic control so as to insure such fair treatment of canal

commerce as may be within the power of the States and localities interested, such conditions will be cheerfully accepted and complied with.

In consideration of this project, if the general board should find there are any other conditions subject to which the project can be recommended, such conditions will be accepted and performed by the States or localities interested, if possible.

Respectfully submitted.

LAKE SUPERIOR AND MISSISSIPPI RIVER CANAL COMMISSION OF MINNESOTA.
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By A. O. EBERHART,
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IRA B. MILLS, *Secretary.*
LAKE SUPERIOR AND MISSISSIPPI RIVER CANAL COMMISSION OF WISCONSIN.
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JOHN CHINNOCK, *Chairman.*
E. F. ACKLEY, *Secretary.*
F. N. STACY, *Statistician.*

EXHIBIT I.

Minnesota counties tributary to canal and river.

	Population.		Valuation of farms.	
	1910	1900	1910	1900
Carlton	17,559	10,017	$3,759,913	$939,664
Chisago	13,537	13,248	12,289,044	5,905,326
Dakota	25,171	21,733	22,986,004	11,793,346
Goodhue	31,637	31,137	32,266,663	18,044,617
Hennepin	333,480	228,340	34,967,221	19,909,980
Houston	14,297	15,400	16,836,250	9,944,080
Pine	15,878	11,546	7,453,287	2,273,424
Ramsey	223,675	170,554	9,726,904	5,621,973
Wabasha	18,554	18,924	19,702,340	12,080,170
Washington	26,013	27,808	16,334,539	9,062,150
Winona	33,398	35,686	22,718,884	14,371,809
St. Louis	163,274	82,932	6,798,209	1,152,486
Total	916,473	667,325	205,839,258	111,099,025

Wisconsin counties tributary to canal and Mississippi River.

	Population, 1910.	Valuation of farms.	
		1910	1900
Barron	29,114	$18,976,694	$6,374,063
Bayfield	15,987	3,209,775	615,578
Buffalo	16,006	16,581,677	9,892,567
Burnett	9,026	4,914,983	1,670,203
Crawford	16,288	12,338,063	6,808,630
Douglas	47,422	2,795,283	722,199
Dunn	25,260	20,913,419	8,748,003
Grant	39,067	42,426,158	26,305,272
La Crosse	43,996	13,790,945	9,298,824
Pepin	7,577	5,971,873	3,254,996
Pierce	22,079	18,997,948	10,733,194
Polk	21,367	16,606,522	6,458,007
St. Croix	25,910	23,998,981	12,022,751
Trempealeau	22,963	21,411,077	11,923,019
Vernon	28,116	25,289,099	13,556,799
Washburn	8,196	3,570,620	702,311
Total	378,314	251,793,117	129,086,416

Farm crop statistics and values.

	Number of farms, 1910.	Farm-acres cultivated.	Crop value.	Live-stock value.
Carlton	1,195	120,505	$430,866	$422,503
Chisago	2,005	225,773	1,544,517	1,344,671
Dakota	2,163	329,801	3,177,701	2,316,378
Goodhue	3,090	462,052	3,997,787	3,507,509
Hennepin	3,853	284,378	4,132,598	2,809,233
Houston	1,912	327,094	1,979,513	2,178,443
Pine	2,066	230,689	846,136	904,663
Ramsey	1,067	60,543	1,072,780	711,008
Wabasha	1,787	320,984	2,736,692	2,170,305
Washington	1,943	226,312	2,129,792	1,669,805
Winona	2,141	374,234	2,712,087	2,638,487
St. Louis	2,465	272,995	919,360	726,394
Total	25,687	3,235,360	25,679,829	21,399,399
Barron	3,852	.....	2,156,442	2,229,092
Bayfield	1,086	.....	343,579	351,244
Buffalo	2,161	.....	2,203,637	2,479,855
Burnett	1,676	.....	552,902	612,807
Crawford	1,983	.....	1,797,644	1,896,759
Douglas	853	.....	255,583	267,042
Dunn	3,297	.....	2,580,851	2,565,337
Grant	4,056	.....	4,702,792	5,694,621
La Crosse	1,811	.....	1,694,725	1,867,574
Pepin	1,038	.....	796,771	755,252
Pierce	3,213	.....	2,802,150	2,327,125
Polk	3,399	.....	1,925,250	2,143,337
St. Croix	3,119	.....	3,286,125	2,864,850
Trempealeau	3,008	.....	2,747,785	2,885,615
Vernon	4,003	.....	3,197,871	3,193,191
Washburn	972	.....	401,184	405,508
Total	39,527	.....	31,445,291	32,539,209

	Grain.	Hay.	Potatoes.	Fruit.	Dairy cows.
	Bushels.	*Tons.*	*Bushels.*	*Bushels.*	
Carlton	56,891	20,215	239,715	231	4,033
Chisago	1,116,799	63,920	1,874,597	4,957	14,405
Dakota	4,374,599	67,233	629,503	26,486	12,204
Goodhue	5,462,783	117,488	165,728	48,020	24,111
Hennepin	2,321,310	124,811	2,438,132	58,734	22,379
Houston	2,708,198	67,052	172,090	33,713	14,381
Pine	365,316	48,046	468,834	1,741	9,788
Ramsey	405,039	29,828	497,939	3,364	5,632
Wabasha	3,968,412	60,240	198,128	41,511	11,106
Washington	2,533,926	62,250	758,162	15,162	10,637
Winona	3,786,077	75,319	308,444	39,443	16,450
St. Louis	44,214	28,247	355,537	137	6,234
Total	27,143,564	764,649	8,106,809	273,499	151,360
Barron	1,553,990	102,025	1,194,012	8,435	23,081
Bayfield	59,769	13,827	159,710	2,451	2,385
Buffalo	3,009,703	75,059	177,849	25,478	21,627
Burnett	375,877	32,113	287,735	654	7,634
Crawford	1,503,992	62,699	137,894	47,030	16,681
Douglas	41,506	11,028	111,103	359	2,085
Dunn	3,104,140	86,168	689,975	17,129	24,001
Grant	6,090,204	140,497	368,825	51,708	36,520
La Crosse	1,980,076	60,423	242,130	32,455	19,984
Pepin	1,067,479	21,482	66,610	11,130	6,350
Pierce	3,975,946	74,378	282,223	35,995	17,912
Polk	2,047,748	93,561	468,361	4,210	22,473
St. Croix	4,731,807	103,271	375,615	5,193	23,804
Trempealeau	3,453,979	103,095	159,672	30,382	25,049
Vernon	2,587,993	116,389	319,026	73,412	30,187
Washburn	211,342	17,658	201,534	731	3,401
Total	35,795,551	1,113,673	5,242,274	346,752	283,174

Southern Minnesota counties tributary to canal.

	Grain crop.	Potato crop.		Grain crop.	Potato crop.
Blue Earth	5,803,374	213,787	Olmsted	4,219,103	164,919
Brown	4,599,816	126,438	Rice	3,647,307	150,742
Carver	2,479,852	145,356	Scott	2,230,773	105,268
Dodge	2,291,293	79,181	Sibley	4,287,299	135,022
Faribault	5,274,642	140,483	Steele	2,594,220	138,390
Fillmore	5,665,286	172,405	Waseca	2,770,886	107,100
Freeborn	3,942,389	196,865	Watonwan	3,564,741	69,430
Le Sueur	3,076,483	117,476			
Martin	6,284,407	175,074		70,987,012	2,567,203
Mower	5,002,794	231,528			
Nicollet	3,252,347	97,739			

Exhibit II.

Elements of locks and dams, Monongahela River.

Characteristics.	Lock numbers.				
	1	2	3		4
			Old.	New.	
Distance from mouth, miles	195	11.20	25.0	23.8	41.24.
When built:					
First lock	1841	1841	1844	1906–7	1844.
Second lock	1848	1853–4	1883		1886.
When rebuilt		1904–5			
Lock, size, feet	50 by 158. 56 by 216.	56 by 360.	50 by 158.	56 by 360.	50 by 158.
		56 by 360.	56 by 277.	56 by 360.	56 by 277.
Lift at low water	4.4 [1]	7.8	7.44	8.4	11.5.
Depth on lower sill, feet	9.3.	8.68		8.42	5.87.
Guard	10.3.	12.3.	10.0.	12.1.	8.8.
Elevation, upper sill	696.7. 695.2.	706.6 [2]	716.3.	715.25.	719.78. 726.18.
Elevation, lower sill	695.6. 693.7.	698.7 [3]	709.46.	707.08.	718.38. 718.03.
Founded on	Rock.	Piles in gravel.	Gravel.	Rock.	Gravel.
Walls, height above floor	23.3. 24.2.	29.77.	23.8. 24.1.	31.5.	25.4. 25.8.
Walls, base width	12.0.	River wall. 16.4 [4]	12.0. 14.0.	16, 20, 22.	12.0. 15.0.
Upper guide wall, length	300.	105.	789.	360.	890.
Lower guide wall, length	320.	300.	275.	360.	310.
Upper guard wall, length	195.	150.	225.	150.	166.
Lower guard wall, length	None.	None.	None.	None.	None.
Dam: Length, feet	962.5.	808.	689.	684.36.	703.
Material	Timber, stone filled.	Concrete on piles.	Timber, stone filled.	Concrete on piles.	Timber, stone filled.
Elevation of crest and pool	707.4.	715.25.	723.1.	723.9.	734.98.
Founded on	Gravel.	Piles in gravel.	Gravel.	Piles in gravel and sand.	Gravel.
Fall-over at epoch of submergence of lock walls.	0 to 4 feet [5]	3.0.	1.9.		2.7.
Length of pool, miles	9.25.	12.6.	16.24.	17.44.	17.68.
Abutment—Type	Crib.	Concrete, vertical face.	Crib, vertical face.	Concrete, vertical face.	Concrete, sloped.
Founded on	Gravel.	Piles in gravel.	Gravel.	Piles in gravel and sand.	Gravel.

[1] About pool full Davis Island Dam.
[2] Upper guard sill, 707.1.
[3] Lower guard sill, 699.25.
[4] Middle wall, 20 feet.
[5] Dependent on stage of Allegheny River.

Elements of locks and dams, Monongahela River—Continued.

Characteristics.	Lock numbers.				
	5	6	7	8	9
Distance from mouth, miles	58.9	68.67	82.74	87.55	93.3.
When built	1856	1856	1883	1882–9	1874–9.
Lock, size, feet	50 by 165.5	50 by 165.4	50 by 159	50 by 161.6	50 by 160.
Lift at low water	10.93	13.3	9.2	10.6	12.33.
Depth on lower sill, feet	5.2	5.5	6.61	5.2	5.5.
Guard	10.5	9.6	9.2	10.2	7.6.
Elevation, upper sill	741.31	753.57	763.84	775.0	767.0.
Elevation, lower sill	730.28	741.36	754.19	765.0	775.55.
Founded on	Gravel	Rock	Rock	Rock	Rock.
Walls, height above floor	26.6	29.4	26.0	36.0	27.5.
Walls, base width	14.0	14.0	14.5	18.0	11.6.
Upper guide wall, length	None	None	34	190	130.
Lower guide wall, length	118	120	85	107	173.
Upper guard wall, length	108	130	238	107	65.
Lower guard wall, length	None	None	None	None	None.
Dam—Length, feet	620	626	525.5	600	410.
Material	Timber, stone filled.	Timber, stone filled.	Timber, stone filled.	Timber, stone filled.	Masonry.
Elevation of crest and pool	746.41	760.15	770.0	780.8	793.4.
Founded on	Gravel	Gravel	Gravel	Gravel	Rock.
Fall-over at epoch of submergence of lock walls.	3.2	5.7	4.8	5.5	9.6.
Length of pool, miles	9.75	14.07	4.81	5.75	9.3.
Abutment—Type	Crib, vertical face.	Crib, vertical face.	Masonry, sloped.	Masonry	Masonry, sloped.
Founded on	Gravel	Gravel	Hard pan	Rock	Rock.

Characteristics.	Lock numbers.					
	10	11	12	13	14	15
Distance from mouth, miles	102.6	104.95	109.85	111.80	115.50	124.10.
When built	1897–1903	1901–1903	1901–1903	1901–1903	1901–1903	1901–1903.
Lock, size, feet	56 by 182	56 by 182	56 by 182	56 by 182	56 by 182	56 by 182.
Lift at low water	10.67	10.67	10.67	10.67	10.67	10.67.
Depth on lower sill, feet	7.0	7.0	7.0	7.0	7.0	7.0.
Guard	8.5	7.7	8.0	8.0	8.0	8.0.
Elevation, upper sill	790.58	807.25	817.92	828.59	839.25	849.92.
Elevation, lower sill	786.92	797.59	808.25	818.92	829.58	840.25.
Founded on	Rock	Rock	Rock	Rock	Rock	Rock.
Walls, height above floor	27.5	26.5	27.0	27.0	27.0	27.0.
Walls, base width	16.0	14 and 15	14 and 15	14 and 15	14 and 15	14 and 15.
Upper guide wall, length	180.2	100.3	100	None	100	99.7.
Lower guide wall, length	155.6	152	52.3	151.7	152	117.
Upper guard wall, length	53.3	91.2	66	91	90	91.
Lower guard wall, length	52.5	None	None	None	None	33.
Dam—Length, feet	445	500	447	425	433	420.
Material	Concrete	Concrete	Concrete	Concrete	Concrete	Concrete.
Elevation of crest and pool	804.66	815.33	826	836.67	847.33	838.0.
Founded on	Rock	Rock	Rock	Rock	Rock	Rock.
Fall-over at epoch of submergence of lock walls.	7.0	8.9	8.4	9.3	8.5	7.1.
Length of pool, miles	2.35	4.9	1.95	3.7	8.6	.....
Abutment—Type	Concrete, sloped.	Concrete, sloped.	Timber, vertical face.	Concrete, sloped.	Concrete, sloped.	Masonry, vertical face.
Founded on	Rock	Rock	Rock	Rock	Rock	Rock.

EXHIBIT III.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Pittsburgh, Pa., November 7, 1913.

Mr. F. N. STACY,
Holland House, New York, N. Y.

DEAR SIR: In reply to your letter of the 4th instant to Col. Newcomer, my predecessor in charge of this office, I transmit herewith a letter statement prepared by Asst. Engineer T. P. Roberts, of this office, which answers your various questions in regard to commerce of rivers in the Pittsburgh, Pa., engineer district.

By direction and in the absence of Lieut. Col. Francis R. Shunk, Corps of Engineers:

Very respectfully,

H. J. ROSSITER, *Chief Clerk.*

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Pittsburgh, Pa., November 7, 1913.

From: Thomas P. Roberts, assistant engineer.
To: The District Engineer Officer, Pittsburgh, Pa.
Subject: Answers to questions proposed by the Lake Superior and Mississippi River Canal Commission.

1. "Aggregate cargo tonnage per annum (approximate) on rivers and canals of your district."

For several years past the total cargo tonnage of the Pittsburgh district has not varied much from 12,000,000 tons per annum. Of this total about 9,000,000 tons is coal from the Monongahela River, of which from 2,000,000 to 3,000,000 tons are shipped down the Ohio to Cincinnati and points farther west and south. Of the residue of this coal about 1,000,000 tons (rough estimate) are shipped by rail to Conneaut Harbor on Lake Erie, and from 5,000,000 to 6,000,000 are locally consumed. Of the local consumption about one-half is made into coke by the Jones & Laughlin Co., mostly within the limits of this city. This firm is rapidly enlarging its river business in coking coal to meet the demands of its extensive new plant on the Ohio about 18 miles below Pittsburgh. This one firm's business will in the near future increase its river coal demand from its present 3,000,000 tons to about 5,000,000 per annum.

2. "Average draft and cargo tonnage of coal carrying boats and barges on the Monongahela and through your canals."

Until within the last few years all the boats, barges, and flats used in the Monongahela were of wood. These vessels are not registered, and their number in use at present is unknown. Inquiries made in 1904 developed the fact that at that time there were between 1,000 and 1,100 vessels employed in the local trade of Pittsburgh, ranging from 200 to 400 tons. This did not include the coal flats used by Jones & Laughlin, about 500 in number, of average capacity of about 500 tons.

The boats and barges in the Ohio River traffic were estimated to number somewhat more than 2,500, ranging from 500 to 1,200 tons capacity each. The great number of boats heretofore used in the Ohio traffic is explained by the fact that owing to the uncertainties of the navigation of the river and time lost in trips to Memphis, New Orleans, etc., many of them were not loaded more than twice during a year. The upper Ohio was navigable for coal boats upon an average of only 89 days per annum, and these days very unequally distributed, six months sometimes passing without sufficient depth. With the dams so far completed on the Ohio, the average number of days per annum on the river from Pittsburgh for the coal trade has been increased to 116.

Already there appears to be a transformation in the Ohio River traffic. The American Steel & Wire Co. has in operation a line between Pittsburgh and Louisville of 10 covered steel boats 200 by 36 by 9 feet loaded depth, of 1,500 tons cargo capacity, for wire nails, horseshoes, cotton ties, etc. Jones & Laugh-

lin, for their Ohio River coal traffic, from the mines to Alquippa, 18 miles below Pittsburgh, have in operation twenty-four 200 by 26 feet steel boats, 7½ to 8½ feet draft, capacity 1,000 to 1,100 tons.

The Crucible Steel Co., of Pittsburgh, has 22 steel barges 100 by 26 feet, 7½ feet draft. Other parties are also building steel boats. All of these steel boats ply the lower pools of the Monongahela River, and some of them also ply upon the lower Allegheny River in the local business between mills. There are besides several hundred sand and gravel flats plying the three rivers about Pittsburgh.

The usual size of a coal tow on the Monongahela River for the lower Ohio and Mississippi traffic is three boats of 1,000 tons each, 175 by 26 feet, 8 feet draft, with towboat, able to pass through the locks unbroken. The available size of each of the double locks, Dams 1 to 6, is 360 by 56 feet; minimum depth on sills, 8 feet. Nearly the same quantity of coal in more numerous barges of 500 tons capacity each is also passed. From 7 to 10 of the small flats with their steamer are able to be passed through the locks in one operation.

From the above it will appear that the locks on the Monongahela do a very miscellaneous business. The actual "average capacity" of the boats has never been given in the annual reports, although it could be calculated, if desired, from the monthly reports from the various locks.

3. "Per ton cost of water transportation of coal in your district, stating approximate average ton-mile rate, and giving, if data handy, a few cases of economical transportation."

Several years ago the Jones & Laughlin Steel Co. reported officially that the actual cost to them of moving coal from their mines to their mills and coke ovens in Pittsburgh, then doing a business of 2,000,000 tons per annum, was 4.2 cents per ton. The round-trip distance was 104 miles, including the passage of three locks in each direction. The estimate included the return of the empty boats to the mines. The final result was a ton-mile rate of 0.08 cent. To this was added, in this office, interest account on capital invested at 5 per cent and 15 per cent for depreciation of floating plant, which brought the ton-mile rate up to 0.18 cent or (1.8 mills).

With the larger locks which have been recently constructed or in progress enabling larger fleets of greater draft to pass unbroken down the Monongahela, there will be a considerable reduction in the above ton-mile rate.

It is to be remarked that other firms doing a less regular business find the cost considerably more than that reported by the Jones & Laughlin Co. Some of them have estimated their cost at double the Jones & Laughlin figures for the same distance and number of lockings.

The actual running time and cost of steamers and fleets, if it could be differentiated, will not, however, vary much from the Jones & Laughlin carefully estimated figures.

Very much could be said of the cost of transportation of coal on the Ohio and Mississippi Rivers. The actual cost of round-trip running expenses under favorable conditions on the Mississippi River between Pittsburgh and New Orleans, including return of empty boats, has been given at from 60 to 75 cents per ton, distance about 2,000 miles one way. This refers to a fleet carrying, say, 20,000 tons, Pittsburgh to Louisville, 600 miles, and thence with a larger towboat, taking two of the upper-river fleets, or, say, 40,000 tons, Louisville to New Orleans, 1,360 miles.

For an annual business of 3,500 tons of coal, systematized, on the river, Pittsburgh to Louisville, when 9 feet depth will be available for nearly the entire year, it has been estimated that the cost per ton, including return of empty boats to the mines, will be 24.1 cents, interest and depreciation of plant also included, which would make four-tenths of a mill per ton-mile. The figures in no case include a profit. The figures if made now and taking into account the increased cost of steel boats over wooden ones heretofore engaged in the traffic, would be considerably increased in the item of first cost and interest minus a considerable reduction in depreciation, with the result of some final increase. It was estimated that on the improved river the existing business could be done with one-third of the capital investment, with fleets not larger in area than the area of Ohio River locks, viz, 600 by 110 feet.

4. "Per ton cost of unloading coal from boats and barges to dock with modern machinery and methods."

We have on the Monongahela, in pool No. 1, a double ladder coal dredge unloading 500 tons per hour, raising it about 70 feet, and transferring the coal by an endless belt several hundred yards to the cars which distribute the coal to the coke ovens for a cost of one-quarter of a cent per ton. This is only about one-twelfth the cost of simply raising the coal with a clamshell to the height of 70 feet.

5. "Amount per ton damage to coal from such handling."

On this point there appears about Pittsburgh to be very little demand in recent years for lump coal. The proportion of "run of mine," or nonscreened coal has greatly increased as shipped both by rail and boat. It is, therefore, the case that the handling of the coal, provided it results in no loss of weight, results in no financial damage. For steam making also of late years coal slack with much dust in it, carrying often much sulphur, as compared with screened coal, is much used on account of its low price. Natural gas is used for domestic fires to a very great extent over most of the district.

6. "How does coal carrying by water compare with rail transportation in regard to economy of transportation and handling?"

As for local rail rates they are very high as compared with river rates in the Monongahela Valley, nevertheless in this city, owing very largely to its topography, much the greater part of the local demand is met by the railroads. If, however, the demand at a particular point on the river is very large, as is the case of the Jones & Laughlin Co., it would, with proper unloading machinery, be possible to save 25 cents per ton in Pittsburgh, as that firm does over the published rail rates. Coal from mines along the river at 40 to 60 miles distance is charged 38 cents a ton for transportation by rail, included in which is the usual "terminal charge" equal, it is understood, to 25 miles rail haul. The wagon haul from boats for domestic coal operates against the widespread distribution of river coal in this city.

As a matter of fact but little attempt is made by the railroads in the Monongahela Valley above Pittsburgh to compete in the local markets with boats for the home trade. Local mines often serve the trade. The railroads seem to be more concerned in the integrity of their main line tracks in the interest of their enormous through coal trade destined for the lake region than for local interests. Switches to small establishments are not favored, and cross-over tracks are placed with rare exceptions only to serve the needs of the railroads.

The railroads naturally have the advantage over coal in boats so far as unloading is concerned, excepting where special machinery is employed, such as has been referred to elsewhere.

THOS. P. ROBERTS, *Assistant Engineer.*

EXHIBIT IV.

Mr. F. N. STACY,
Holland House, New York, N. Y.

DEAR SIR: In reply to your letter of the 9th instant, I inclose herewith answers prepared by Mr. T. P. Roberts, assistant engineer, to your various questions concerning commerce, etc., on the Monongahela River.

For and in the absence of Lieut. Col. Francis R. Shunk, Corps of Engineers:

Very respectfully,

H. J. ROSSITER, *Chief Clerk.*

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Pittsburgh, Pa., November 13, 1913.

From: Thomas P. Roberts, assistant engineer.
To: The District Engineer Officer, Pittsburgh, Pa.
Subject: Answers to questions of Lake Superior and Mississippi River Commission, dated November 9, 1913.

1. "Data of traffic and vessels passing one of your principal Monongahela River locks for some month of comparatively large traffic this season," etc.

The locks at Dam No. 3, 22 miles above Pittsburgh, are selected. The up and down river business from January to October by months during the present year has been as follows:

	Steamers.		Coal boats, barges, and boat bottoms.		Coal traffic (tons).		Total traffic (tons).	
	Up.	Down.	Up.	Down.	Up.	Down.	Up.	Down.
1913.								
January	454	451	2,019	2,074	160	919,800	6,196	943,230
February	485	478	2,080	2,106	0	983,680	3,115	1,000,930
March	517	524	2,086	2,162	0	1,042,480	9,090	1,064,170
April	496	486	2,051	2,033	160	897,320	11,607	920,301
May	325	329	1,848	1,768	260	837,160	7,538	847,796
June	338	341	1,782	1,831	0	830,000	8,738	838,086
July	357	351	1,647	1,697	160	783,640	8,095	789,554
August	401	400	1,989	1,967	80	910,600	5,960	916,837
September	344	339	2,008	1,959	0	886,800	6,483	888,044

The daily records kept at the locks have to be consulted to differentiate the coal boats from the coal barges, and boat bottoms. It will require two or three days' time to obtain the desired information from the log book kept at Lock 3. The information will be mailed to any address as requested. By "boat bottoms" is meant new coal boat bottoms shipped down the Allegheny and sent up to the mines on the Monongahela, to be sided up with plank gunwales 10 feet high, making boats 180 by 26 by 10 feet high of 1,000 to 1,100 tons capacity, at say 8½ feet draft.

2. "Copies of printed reports of district engineer," etc.

Annual reports for fiscal years 1910 and 1912, of which spare copies have been found, are inclosed herewith. While the reports in general are for fiscal year, commercial statistics are given for calendar years 1909 and 1911. Also there is inclosed lock gauge records of sill depths, Locks 1 to 6, inclusive, for the year 1912. The lower gauges at locks are to be referred to as giving the navigable depth for boats, notwithstanding that when the adjustable tops on the dams are raised there may be a greater depth on the upper than on the lower lock sill.

Regarding (*a*) navigable depths on upper Monongahela lock sills, will say that normal minimum depth at new Locks 10, 11, 12, 13, 14, and 15, is 7 feet. High floods reach depths of 35 feet. Navigation is practicable until the lock walls are flooded, say 20 feet, on lower gauge. Locks 6, 7, 8, and 9 have been recommended for improvement and enlargement. At present in that part of the river during prolonged droughts the navigable depth is no more than 5 feet, a stage lasting on rare occasions for a month or more.

At present there is only one firm shipping coal from above No. 6 dam. The company's business amounts to about 25,000 tons annually (from its own mines, in its own flat boats, to its own manufacturing establishment in McKeesport, Pool No. 2, a distance of about 85 miles below the mines). The mines are in the 14th pool. During seasons of severe drought the depth available at Locks 7, 8, and 9 has been as low as 5 feet, permitting the safe passage of flats loaded to only about 4.5 to 4.75 feet, with flats carrying about 200 tons each. However, with, say, five such flats a thousand tons could be moved in one fleet. Just what profits were at such times I have no information, but as the saving was fully $250 for each thousand tons over rail rates, I scarcely think the expense of the small boat, small crew, and other operating expenses could have been so much. Thirty dollars per diem would have been, I think, a proper allowance for this particular case, and not over five days to make a round trip. (The company's demands did not require the constant service of its towboat to obtain its coal supply. At least more frequent trips could have been made.)

It is to be noted that it is to area rather than depth that credit is due for the wonderfully low rates of transportation possible on our western rivers, especially on the Ohio. But no other possible kind of steamer could handle fleets in the Ohio, with its varying conditions of depth and current velocities, but stern-wheel boats, equipped with several balanced rudders which insure enormous steering power when the wheel is backed against the rudders. About busy locks, as on the Monongahela, side wheel or propeller boats with consider-

able tows, no matter what their ultimate power may be, would cause delays, confusion, and accidents. Steamers which can not quickly check the speed of their fleets and turn their fleets without the steamer moving more than a few feet, or even with the steamer itself tied to a pile, would never do for the peculiar traffic of the Monongahela, which is persistent night and day, winter and summer, with serious accidents exceedingly rare about the locks.

As to (*b*) "Approximate first cost of coal handling with a double ladder dredge of 500 tons capacity per hour."

The following information regarding unloaders has been received from the Jones & Laughlin Steel Co.:

1. Capacity:
   Hazelwood (Monongahela River) 600 tons per hour (approximate).
   Aliquippa (Ohio River) 800 tons per hour (approximate).
2. Cost:
   Hazelwood, approximately $30,000 to $40,000.
   Aliquippa, much more on account of bad foundation.
3. Type:
   Buckets at both plants.
   Buckets measure 23½ inches by 26 inches by 4 feet 10¼ inches long, and hold 675 pounds each.

I will add to the above that part of the mechanism is a tension cable beneath the elevator which keeps pulling the boat against the coal all the time, so that the buckets are always full. The barges have sloped sides to favor movement of the coal toward the buckets. Only one man is required to attend to the unloading about the boat.

As to (*c*) "Comparison of the cost of delivery of Monongahela River coal by rail and by river to points in the pools above No. 6, shows a saving of from 30 to 50 cents a ton in favor of water transportation." (Quoted from Report of Chief of Engineers for 1912, vol. 1, p. 905.)

Reference is to Dam 6 on the Ohio, about 29 miles below Pittsburgh. The center of the active river mining district on the Monongahela is about 50 miles above the city. The 50-cent saving is, therefore, for the 29 plus 50, or 79-mile distance, and the 30 cents for the 50 miles, distance to Pittsburgh.

In my previous letter I mentioned that some of the smaller manufacturers along the Ohio, above No. 6, were contemplating the erection of hoists to unload coal from boats; but, as is usually the case, there are from four to six more tracks between the factories and the river banks. The problem of the hoist is very difficult for some of them. This trouble explains why river coal is not more generally used along the extreme upper Ohio. To see coal passing one's doors on the river so much cheaper than one must pay for it from another source must, of course, be "trying."

I will add, in conclusion, that on the projected so-called "ship canal," Ohio River to Lake Erie, leaving the Ohio River 25 miles below Pittsburgh, thence via the Beaver and Mahoning Rivers to near Ashtabula, on Lake Erie, distance 103 miles, 30 locks, the carefully estimated cost of moving coal from Pittsburgh to and into vessels on Lake Erie, in boats of 11 feet draft, 2,000 tons capacity, was actually 20.1 cents per ton, or 1.44 mills per ton per mile, from Pittsburgh to Lake Erie, but with toll charges of 30 cents and other sources of profit added the final charge would be 60.2 cents per ton, or 4.30 mills per ton-mile, as against 5.53 mills per ton-mile by the Bessemer & Lake Erie Railroad, or over 8 mills per ton-mile charged by other railroads from Pittsburgh to Lake Erie.

THOS. P. ROBERTS, *Assistant Engineer.*

ADDENDA.

The average cargoes of various types of vessels passing Lock No. 3, Monongahela River, during March, 1913, is shown in the following statement:

Downward:	Average tons per boat.
106 boats, carrying 166,000 tons	1,000
1,422 barges, carrying 722,560 tons	508
570 flats, carrying 152,000 tons	268
1 model barge, carrying 1,400 tons	1,400

A few small naphtha boats passed are not included in the above. Five hundred and fourteen steamers passed downward with the loaded vessels. The upward movement was practically the same, with the exception that all boats, barges, and fleets were empty.

Several blue prints of coal hoists, including one of the double ladder dredges referred to in my previous letter, are inclosed.[1]

THOS. P. ROBERTS, *Assistant Engineer.*

EXHIBIT V.

Mr. F. N. STACY,
State Capitol Building, St. Paul, Minn.

DEAR SIR: Noting your favor of the 30th ultimo; tonnage of coal received in New York Harbor is about 40,000,000 per annum. In the absence of specific figures, it is impossible to tell exactly what the amount is, but it is understood to be about as mentioned, with something less than one-half retained for local use, the remainder shipped east and south.

The tonnage for city docks is brought by barge from rail terminals, with the exception of a half dozen yards which handle car-ferry coal. Cost of unloading from boats is of itself a small matter when done by steam shovel, in this case probably amounting to 3 or 4 cents a ton, although in such a matter there will always be a question as to how much should be allowed for overhead expense, etc.

Yours, truly,

F. W. SAWARD, *General Manager.*

EXHIBIT VI.

OCTOBER 9, 1913.

Mr. F. W. STACEY,
Statistician Lake Superior and Mississippi River
Canal Commission, State Capitol Building, St. Paul, Minn.

DEAR SIR: Referring to your recent request for preliminary estimate on coal-handling equipment of various capacities and arrangement, we are pleased to submit the following preliminary estimate:

For unloading coal from ore-carrying vessels of 5,000 to 12,000 tons of iron-ore capacity and reloading the same in canal barges. Such arrangement is outlined by sketch 1, showing a 2-ton grab bucket operated by a movable steam steeple tower which discharges coal to the storage bunkers of approximately the capacity of the boat, from which storage it is discharged directly to the canal barge.

(1) At a maximum-capacity rate of 500 tons per hour, 5,000 tons per 10-hour day, 800,000 tons 6 months—160 days:

Unloading machinery costs	$100,000.00
Operating cost per ton	.70
Fixed charge per ton	1.25
Reloading machinery costs	50,000.00
Operating cost per ton	.14
Fixed charges	.625

For unloading from boats and storing in pile on ground which could extend back from the shore a distance of 500 feet. Such an arrangement as outlined by sketch 4, showing a grab bucket operated on a mast and gaff, for unloading to elevated hopper, from which point the coal is distributed to pile on land by automatic railway.

(2) At a maximum-capacity rate of 50 tons per hour, 500 tons per 10-hour day, 80,000 tons 6 months—160 days:

Unloading machinery costs	$6,000.00
Operating cost per ton	.02 5/10
Fixed charge per ton	.75
Storing machinery costs	2,000.00
Operating cost per ton	.42
Fixed charge per ton	.25

[1] Not printed.

This is a standard arrangement of coal-handling machinery for the noted capacities. The machinery is simple and rugged and the entire plant can be operated with one engineer and two ordinary laborers.

(3) For unloading from boats and transferring on trestle 30 feet high to a distance of 1,200 feet at any point on this line, coal could be deposited in storage on ground or discharged through chutes reloading to railroad cars. Such an arrangement is outlined by sketch 2, which shows a grab bucket operated on a movable steam steeple tower which operates on a trestle about 30 feet high.

At a maximum capacity rate of 750 tons per hour, 7,500 tons per 10-hour day, 1,200,000 tons 6 months—160 days:	
Unloading machinery costs	$150,000.00
Operating cost per ton	.70
Fixed charge per ton	1.25
Transfer machinery costs	85,000.00
Operating cost per ton	.25
Fixed charge per ton	.71

For unloading from boats and transferring to storage pile or to railroad cars or reclaiming from storage pile and reloading to railroad cars or to barges. The arrangement is outlined by sketch 3 and shows the complete system of unloading, storing, reclaiming, and reloading either to railroad cars or barges. The sketch shows the plant arranged for a capacity of 500 tons per hour. A plant of similar operation can be arranged for any desired capacity by increasing the number of units.

At a maximum capacity rate of 500 tons per hour, 5,000 tons per 10-hour day, 800,000 tons 6 months—160 days:	
Unloading machinery costs	$100,000.00
Operating cost per ton	.70
Fixed cost per ton	1.25
Transporting machinery costs	105,000.00
Operating cost per ton	.25
Fixed cost per ton	1.31
Reclaiming machinery costs	150,000.00
Operating cost per ton	1.00
Fixed cost per ton	1.87

By referring to our catalogue you will see a detailed description of the equipment and operation of plants constructed along similar lines to those noted above.

The amount of damage that coal sustains in being handled depends to a great extent on the ultimate use of the coal. The extent of damage to bituminous coal occasioned by handling in plants such as described will be a very small percentage. If the coal is to be used in boiler plants, the breaking is of advantage rather than otherwise, as it is necessary to crush run-of-mine coal before it can be economically fired by automatic stokers.

Where large storage of coal is desired, the arrangement as shown by sketch 3 permits the use of subaqueous storage as well as dry storage. By storing the coal under water the danger of spontaneous combustion is eliminated and the deterioration of coal stored under water is less than stored in the open.

We trust that the inclosed estimates will answer your requirements in sufficient detail for your present purpose.

Yours, very truly,

C. W. HUNT CO. (INC.),
FRED E. MURPHY,
Assistant Chief Engineer.

EXHIBIT VII.

[The Brown Hoisting Machinery Co., patent automatic hoisting and conveying appliances, 50 Church Street.]

NEW YORK, *October 23, 1913.*

Mr. F. N. STACY,
Room No. 118, Holland House, New York City.

DEAR SIR: We beg to acknowledge receipt of your favor of the 22d, and are sending you, under separate cover our catalogue "Q" covering ore and coal

handling machinery, also a few photographs showing coal-handling plants which we have built.

In reference to cost of unloading this depends upon the circumstances under which the unloading is done; that is, whether the coal is simply brought to a bin on the edge of the dock, or carried back to a stock pile. It also depends somewhat on the vessel, as to the size of the hatches and convenience of getting at the coal. We would say that this cost would be from 2 cents to 5 cents a ton, and in some cases may exceed this price of 5 cents.

coal. We would say that this cost would be from 2 cents to 5 cents a ton, and in some cases may exceed this price of 5 cents.

We feel, if your could spare the time, that it would be well worth your while to stop off at our works at Cleveland, Ohio, where they have full information in regard to what has been done by our company in the Lake Superior district.

Trusting, however, that what we are sending you now will answer your purposes for the present, we are,

Yours, truly,

THE BROWN HOISTING MACHINERY CO.,
RICHARD DEVENS,
Manager Eastern Office.

EXHIBIT VIII.

[The McMyler Interstate Co., Cleveland, Ohio, car dumpers, locomotive cranes, ore and coal handling machinery, orange-peel, clam-shell and scraper buckets, railroad equipment. New York Branch, room 1756–50 Church Street.]

NEW YORK, *October 28, 1913.*

Mr. F. N. STACY,
Lake Superior and Mississippi River Canal Commission, St. Paul, Minn.

DEAR SIR: With further reference to your letter of October 22, we inclose herewith photograph [1] showing machinery for unloading coal from lake vessels to cars or storage hopper, or from lake vessels to canal barges; also from canal barges to dock at canal or river terminals.

Two of these machines have unloaded the steamship *Transportation* as follows:

Number of tons unloaded first day of 9 hours	4,200
Number of tons unloaded second day of 8 hours	2,321
Total	6,521

Size of steamer: Length, 376 feet; beam, 49 feet; depth, 30 feet; number of hatches, 9; size of hatches, 26 feet by 12 feet 6 inches.

This rate of unloading includes complete cleaning up of steamer.

We estimate that the cost of unloading coal under these conditions should not exceed 2 cents per ton for labor, fuel, and repairs. This cost does not include the interest on the first cost of the machinery and wharf.

If storage back of the machines is desired we can furnish steam or electrically operated bridge tramways of any desired unloading and storage capacity.

Yours, very truly,

THE MCMYLER INTERSTATE CO.

EXHIBIT IX.

[Mead-Morrison Manufacturing Co., coal handling and hoisting machinery, Singer Building, 149 Broadway.]

NEW YORK CITY, *September 26, 1913.*

Mr. F. N. STACY,
Statistician, Lake Superior & Mississippi River Canal Commission,
State Capitol Building, St. Paul, Minn.

DEAR SIR: Acknowledging yours of the 25th in reference to the handling and storing of coal in connection with the Lake Superior & Mississippi River Canal:

Taking up in order the questions asked in your letter:

1. What character of coal-hoisting plant would you recommend for unloading coal from lake ore-carrying barges, at the Duluth-Superior docks and loading

[1] Not printed.

into canal barges, such plant to have 1,000,000 tons capacity for a navigating season of six months?

Answer. We would recommend a plant for unloading consisting of 7 towers, steam or electrically operated, with 1½ or 2 ton grabs delivering to cable road which would convey the coal from towers to storage bunkers located along the water front from which the coal could be delivered to the canal barges, or the cable road could be so arranged as to deliver direct to the canal barges without the intermediary storage bins. The advantage of the bins would, of course, be that the coal would be available at all times for loading the canal barges whether a lake steamer happened to be alongside or not.

The type of tower that we would suggest is similr to those used on the lakes at such plants as the Northern Coal & Dock, Superior, Wis., Duluth, Missabe & Northern Railway, Duluth, Minn., Hanna Coal & Dock Co., Superior, Wis.

A plant as described above would have an unloading capacity of about 1,000 tons per hour.

(*a*) What would be the cost of the required hoisting and conveying machinery alone?

Answer. The cost of the unloading towers, cable road, and supporting structures, exclusive of foundations, would be about $400,000.

(*b*) What would be the aggregate cost of plant complete, with storage capacity of 500,000 tons, and auxiliary for weighing and screening?

Answer. The cost of a plant as above, with an unloading capacity of about 1,000 tons an hour and a storage capacity of 500,000 tons, with auxiliary screening plant and track scales for weighing the coal, would be about $1,000,000. This would include the foundations, superstructures, and machinery, but not the cost of the land.

(*c*) What would be the labor and fuel cost per ton for operating such plant?

Answer. We would estimate the labor cost per ton at about 2½ cents and the fuel cost at about one-half per cent per ton, making a total of 3 cents per ton of coal handled.

(*d*) What would be total cost per ton for operating and fixed charge, including depreciation, repairs, and interest on investment, not including site, at the interest rate of 4 per cent?

Answer. On the basis of 1,000,000 tons handled in six months, we would estimate the cost per ton as above, at 12 cents. This cost would, of course, be very much reduced if the quantity of coal handled was doubled by running night shifts, in which case the cost might be brought down to 7 cents or 8 cents.

2. What character of coal-handling plant would you recommend for unloading coal from canal barge of 200 to 800 tons at canal and river terminals?

Answer. For small capacities, not in excess of 500 tons per day, we would recommend a mast and gaff grab bucket equipment. If the capacity required was in excess of 500 tons, say, up to 1,000 tons per day, we would recommend unloading towers, steam or electrically operated, with 1-ton grab. These towers would be of our standard equipment, similar to that installed for the Interborough Rapid Transit Co., Fifty-ninth Street and North River, shown on page 25, catalogue No. 15.

(*a*) What would be the cost of the coal-handling machinery for plant capable of unloading 500,000 tons in six months, hoisting to 100-foot level and conveying 1,000 feet?

Answer. We estimate the cost of a plant to fulfill the above requirements at $250,000, exclusive of foundations.

(*b*) What would be total cost of such plant installed, not including cost of land, with storage capacity of 250,000 tons?

Answer. We estimate the cost of a plant as above described, not including the cost of land, but including the superstructures with machinery and foundations, at $450,000.

(*c*) What would be labor and fuel cost per ton for such unloading at canal and river terminal?

Answer. We estimate the labor and fuel cost for unloading at canal and river terminals at 3½ cents per ton. This on the basis of unloading being done by means of automatic machinery in quantity and not where hand-filled tubs would be used.

(*d*) What would be total cost per ton, including operating and fixed charge, interest at 4 per cent, not including taxes and dividend on investment?

Answer. We estimate the cost on the above basis at 12 cents per ton.

3. What would be cost of plant for unloading on dock from canal barge 500 tons per day, and what would be cost per ton for operating such plant?

Answer. The cost of plant for unloading about 500 tons per day from canal barge would be about $7,000. The cost for operating such a plant, for labor and fuel, on the basis of 500 tons per day, would be about 4 cents per ton.

4. Kindly name some of the principal points where coal-hoisting machinery of the character named has been installed by you.

Answer. We would refer you to our cataloguges No. 15 and No. 16, copies of which we hand you herewith. Most of the unloading plants with large storage are located on the Great Lakes around Duluth and Superior. Besides the plants shown in catalogue No. 15, we have recently installed some electrically operated man-trolley bridges for the Pittsburgh & Lehigh Dock Co., Duluth, the Milwaukee Western Fuel Co., Sixteenth Street dock, Milwaukee, and the Semet-Solvay Co., Detroit, Mich.

Now, as to your question regarding the degradation of coal when being handled from boats and from box cars. We have no positive data on this subject. The opinion seems to prevail among coal dealers here in the East that the loss in handling anthracite coal is between 5 cents and 10 cents per ton for each breaking of bulk, no matter how accomplished. Bituminous coal, of course, will not lose as much in the breaking of bulk. We should say there would be no greater loss in handling coal from boats than in handling from box cars, for the reason that the units in which the coal is handled when taking from boats are larger than the units when handled from box cars, in addition to which, when transportation is made by car, there is the degradation due to the motion of the car.

We trust that the above will be of assistance to you and will be very glad to give you any further information within our power.

Yours, truly,

MEAD-MORRISON MANUFACTURING CO.,
O. G. DALE, *New York Manager.*

EXHIBIT X.

[Department of Docks and Ferries, The City of New York. Bureau of Ferries, Office of Superintendent, Ferry Terminal Building, corner Whitehall and South Streets.]

NEW YORK, *September 30, 1913.*

Mr. F. N. STACY,
Statistician, Lake Superior and Mississippi River Canal Commission.

SIR: Replying to your request for information in connection with the annual delivery of coal and cost per ton of handling the same at our St. George pockets, I would advise you as follows:

First. Total annual deliveries amount to approximately 65,000 tons. The coal delivered is anthracite of pea size.

Second. The unloading plant consists of a steam-driven, double-drum inclined ways clam-shaped bucket hoist. The hoist is approximately 80 feet, and the bucket will hold approximately 1 ton. The coal is unloaded from the bucket into a receiving hopper, and passes from the receiving hopper into the weighing hopper, holding approximately 3,500 pounds when full. The rate of discharge of the coal from the receiving hopper to the weighing hopper is controlled by the weighmaster through the medium of a swinging gate. After weighing, the coal is discharged from the weighing hopper into the loading chute over a pivoted bucket conveyor, by means of which it is distributed throughout the coal bunkers. The coal bunkers have a capacity of approximately 1,800 tons, and the travel of the conveyor to distribute the coal throughout the bunkers is approximately 150 feet. The coal conveyor is motor driven, current for the same being furnished by the local electric light plant.

Third. The operating cost per ton of coal unloaded from the barge is as follows:

1 coal hoist engineer	per day	$4.50
1 laborer for weighing and tending conveyor	do	2.50
Total	do	7.00

Or a total cost of $2,555 per year.

The coal for hoisting purposes, 13 tons per month, at $4 per ton, plus miscellaneous supplies, cost $650 per year.

Cost of power for the conveyor motor, $250 per year.

Total cost of unloading 65,000 tons per year, $3,455, or $5\frac{3}{10}$ cents per ton.

The 65,000 tons per year is not the maximum capacity of the plant, but it is all that the plant is required to handle in order to meet the demands. Coal is delivered alongside in barges holding from 600 to 800 tons. The cost of trimming is borne by the contractor delivering the coal, and is not included in the above.

Fourth. The total unloading cost per ton, including operating expenses, depreciation of plant and interest on plant investment: The depreciation of the plant has been found to be negligible, in that in the six years this plant has been in service approximately no repairs have been required to maintain the same in an efficient and operating condition other than what could be made by the men assigned to operate the same.

The coal pockets and hoist were constructed as part of a contract, including other terminal buildings, waiting rooms, etc., but it is estimated that the coal pockets and hoist alone would involve for first cost an expenditure of $50,000, the interest charges on which would be at the rate of 4 per cent per annum, $2,000 per year, making the total cost, including interest on plant investment and depreciation for hoisting 55,000 tons, or $5,455 per year; or approximately 8.4 cents per ton.

Fifth. With a plant operating full capacity it is estimated that not less than 400 tons per 8-hour day would be hoisted, at which rate the maximum unloading capacity of the plant would be not less than 146,000 tons per year, assuming that the plant is operated only 8 hours during any one day.

The cost of operation for coal for the hoist and power for the motor would be increased approximately in proportion to the amount of coal hoisted, so that the cost per ton of coal unloaded from barge, including operating expenses, depreciation of plant, and interest on plant investment, with the plant unloading 146,000 tons per year, would be:

Labor, $2,555.

Fuel for the hoist, 27 tons per month, at $4 per ton, including miscellaneous supplies, $900 per year.

Power for coal-conveyor motor, $550 per year.

Interest on plant investment at 4 per cent per annum, $2,000.

Or at the rate of approximately 4.1 cents per ton.

I trust this will furnish you with all the information you desire. Any further information that you may require will be forwarded to you upon your request for the same.

Very respectfully,

P. Hanley,
Superintendent of Ferries.

EXHIBIT XI.

Comparison of United States rail and European water rates.[1]

1. COAL.

	Rail distance.	Rail rate.	Water rate.	Per cent water of rail rate.
RHINE.	*Miles.*	*Per ton.*[2]	*Per ton.*[2]	
Ruhrort to Mannheim	202.45	$1.88	$0.409	21.8
Iowa State rates	200–210	1.32	.....	30.9
Illinois State rates	200–210	1.11	.....	36.8
Hocking coal district to lake front	[3] 220	.85	.....	48.1
Ruhrort to Strassburg	267.65	2.26	.726	32.1
Iowa State rates	260–270	1.44	.....	50.4
Illinois State rates	260–270	1.21	.....	60
Fairmount coal district to Lorain	[3] 274	.97	.....	74.8
Ruhrort to Frankfort-on-the-Main	176.14	1.64	.474	28.9
Iowa State rates	175–180	1.24	.....	38.2
Illinois State rates	175–180	1.06	.....	44.7
California, Pa., to Coshocton, Ohio (Pennsylvania R. R.)	173	.95	.....	50
ELBE.				
Hamburg to Magdeburg	156	1.50	.64	42.7
Iowa State rates	150–160	1.18	.....	54.2
Illinois State rates	150–160	1.02	.....	62.7
Pittsburgh No. 8 district to lake front	[3] 150	.88	.....	72.7
Hamburg to Berlin	174	1.69	.71	42
Iowa State rates	170–175	1.225	.....	57.9
Illinois State rates	170–175	1.05	.....	67.6
West Newton, Pa., to Cleveland, Ohio (Baltimore & Ohio)	190	1.00	.....	71
Hamburg to Breslau	370	2.86	1.48	51.8
Iowa State rates	370–380	1.66	.....	89.1
Illinois State rates	360–380	1.37	.....	108.0
Thacker coal district to Sandusky	[3] 365	.97	.....	152.6
Hamburg to Dresden	286	2.36	1.24	52.5
Iowa State rates	280–290	1.48	.....	83.8
Illinois State rates	280–290	1.24	.....	100
Kanawha district to Toledo	[3] 325	.97	.....	127.8

2. GRAIN.

RHINE.	*Miles.*	*Per ton.*[2]	*Per ton.*[2]	
Rotterdam to Mannheim	298	$5.81	$0.626	10.8
Iowa State rates:				
Wheat, flour, millet, and flaxseed	290–300	2.70	.....	23.2
Corn, oats, barley	290–300	2.24	.....	27.9
Illinois State rates:				
Wheat	290–300	2.42	.....	25.9
Other grains	290–300	2.18	.....	28.7
Fremont, Iowa, to Chicago (Chicago, Burlington & Quincy R. R.)—Wheat	296.6	2.60	.....	24.1
Rotterdam to Strassburg	362.66	5.71	1.102	19.3
Iowa State rates:				
Wheat, flour, millet, and flaxseed	360–370	3.08	.....	35.8
Corn, oats, barley	360–370	2.56	.....	43
Illinois State rates:				
Wheat	360–380	2.60	.....	42.4
Other grains	360–380	2.36	.....	46.7
Rochester, N. Y., to Harrisburg, Pa. (Pennsylvania R. R.)—Wheat	356	2.00	.....	55.1
Rotterdam to Frankfort-on-the-Main	282.56	4.36	.764	17.5
Iowa State rates:				
Wheat, flour, millet	280–290	2.66	.....	28.7
Corn, oats, barley	280–290	2.20	.....	34.7
Illinois State rates:				
Wheat	280–290	2.38	.....	32.1
Other grains	280–290	2.16	.....	35.4
Burnham, Pa., to New York City (Pennsylvania R. R.)—Wheat	267	2.00	.....	38.2

[1] The United States rail rates were obtained from the Interstate Commerce Commission and the Bureau of Railway Economics. They are all commodity rates in carload lots. The German rail and water rates are taken from the tables given above.

[2] The foreign rates are for the metric ton of 2,204 pounds, the American rates are for the short ton of 2,000 pounds, and hence should be increased by 10 per cent in order to be strictly comparable.

[3] Estimated.

Comparison of United States rail and European water rates—Continued.

2. GRAIN—Continued.

	Rail distance.	Rail rate.	Water rate.	Per cent water of rail rate.
ELBE.	*Miles.*	*Per ton.*[1]	*Per ton.*[1]	
Hamburg to Magdeburg	156	2.97	$0.67	22.5
Iowa State rates:				
Wheat, flour, millet, and flaxseed	155–160	1.96	.....	34.2
Corn, oats, barley	155–160	1.62	.....	41.3
Illinois State rates:				
Wheat	155–160	1.90	.....	35.3
Other grains	155–160	1.72	.....	39
Neal, Kans., to Kansas City, Mo. (Missouri Pacific)—Wheat	150	2.00	.....	33.5
Hamburg to Breslau	379	6.81	1.55	22.8
Iowa State rates:				
Wheat, flour, millet, and flaxseed	370–380	3.14	.....	49.4
Common barley	370–380	2.62	.....	59.1
Illinois State rates:				
Wheat	360–380	2.60	.....	59.6
Other grain	360–380	2.37	.....	65.4
Oakley, Kans., to Kansas City, Mo. (Union Pacific)—Wheat	377	2.90	.....	53.5
Hamburg to Dresden	286	5.21	1.26	24.2
Iowa State rates:				
Wheat, flour, millet, and flaxseed	280–290	2.66	.....	47.4
Corn, oats, barley	280–290	2.20	.....	57.3
Illinois State rates:				
Wheat	280–290	2.38	.....	53
Other grain	280–290	2.16	.....	58.3
Rutledge, Mo., to Chicago (Atchison)—Wheat	287	2.40	.....	52.5
Hamburg to Breslau	174	3.28	.79	24.1
Iowa State rates:				
Wheat, flour, millet, and flaxseed	170–175	2.02	.....	39.1
Corn, oats, barley	170–175	1.68	.....	47
Illinois State rates:				
Wheat	170–175	1.96	.....	40.3
Other grain	170–175	1.78	.....	44.4
Lewisburg, Pa., to Wilmington, Del. (Pennsylvania R. R.)—Wheat	185	2.00	.....	39.5

[1] The foreign rates are for the metric ton of 2,204 pounds, the American rates are for the short ton of 2,000 pounds, and hence should be increased by 10 per cent in order to be strictly comparable.

EXHIBIT XII.

Western States Line—Canal and lake.

WESTBOUND RATES.

[Class rates in cents per 100 pounds.]

To—	First class.	Second class.	Third class.	Fourth class.	Fifth class.	Sixth class.	Rule 25.	Rule 26.	Rule 28.
Cleveland, Ohio	40	35	28	19	17	15	30	22	22
Detroit, Mich	41	37	29	20	17.	16	31	23	23
Chicago, Ill	42	38	29	22	19	17	32	23	24½
Milwaukee, Wis									
Sault Ste. Marie, Mich.[1]									
Duluth, Minn									
Superior, Wis									
Hancock, Mich									
Houghton, Mich	48	43	33	25	22	20	36½	26	28
Dollar Bay, Mich									
Marquette, Mich.[1]									
Minneapolis, Minn	63	56	42	30	26	22	48	34	33
GROUP POINTS.									
St. Paul, Minn	63	56	42	30	26	22	48	34	33
Altamont, Ill	57	51	40	29	25	22	43	32	33
Annawan, Ill	59	53	41	29	25	23	45	33	33
Atkinson, Ill	60	54	42	30	26	23	46	34	34
Aurora, Ill	48	44	34	24	21	19	37	27	27½
Carthage, Ill	62	55	43	31	27	24	47	34	35
Danville, Ill	45	41	32	23	20	18	35	26	26
Galva, Ill	58	52	41	29	25	22	44	33	33
Joliet, Ill	45	41	32	23	20	18	35	26	26
Kankakee, Ill	45	41	32	23	20	18	35	26	26
Laura, Ill	57	51	40	29	25	22	43	32	33
Mason City, Ill	54	49	38	27	24	21	42	30	31
Moline, Ill	67	60	48	35	30	26	52	39	39½
Monmouth, Ill	62	55	43	31	27	24	47	34	35
Neponset, Ill	56	51	40	28	25	22	43	32	32
Peoria, Ill	53	48	37	27	23	21	41	30	30½
Racine, Wis	45	41	32	23	20	18	35	26	26
St. Louis, Mo	58	52	41	29	25	22	44	33	33
Streator, Ill	53	48	37	27	23	21	41	30	30½
Westville, Ill	51	46	36	26	22	20	39	29	29½
Trans-Mississippi	58	52	41	29	25	22	44	33	33

[1] The rates to Marquette and Sault Ste. Marie do not include the dockage at those places, this company having no docks at these points.

Anchor Line—Rail and lake.

WESTBOUND RATES FROM NEW YORK.

[Class rates in cents per 100 pounds.]

To—	First class.	Second class.	Third class.	Fourth class.	Fifth class.	Sixth class.	Rule 25.	Rule 26.
Cleveland, Ohio	50	43	34	23	20	17	36½	27
Detroit, Mich	51	45	35	24	20	18	38	28
Chicago, Ill.	62	54	41	30	25	21	46	33
Milwaukee, Wis.								
Sault Ste. Marie, Mich.[1]								
Duluth, Minn.	68	59	45	33	28	24	50	36
Hancock, Mich.								
Houghton, Mich								
Marquette, Mich.[1]								
Superior, Wis.								
GROUP POINTS.								
St. Paul, Minn.	83	72	54	38	32	26	61	43
Altamont, Ill.	77	67	52	37	31	26	57	42
Annawan, Ill.	79	69	53	37	31	27	59	42
Atkinson, Ill.	80	70	54	38	32	27	59	43
Aurora, Ill.	68	60	46	32	27	23	51	37
Carthage, Ill.	82	71	55	39	33	28	60	44
Danville, Ill.	65	57	44	31	26	22	48	32
Galva, Ill.	78	68	53	37	31	26	58	45
Joliet, Ill.	65	57	44	31	26	22	48	35
Kankakee, Ill.	65	57	44	31	26	22	48	35
Laura, Ill.	77	67	52	37	31	26	57	42
Mason City, Ill.	74	65	50	35	30	25	55	40
Moline, Ill.	87	76	60	43	36	30	65	49
Monmouth, Ill.	82	71	55	39	33	28	60	44
Neponset, Ill.	76	67	52	36	31	26	57	42
Peoria, Ill.	73	64	49	35	29	25	54	39
Racine, Wis.	65	57	44	31	26	22	48	35
Streator, Ill.	73	64	49	35	29	25	54	39
Westville, Ill.	71	62	48	34	28	24	53	38
St. Louis, Mo.	78	68	53	37	31	26	58	42
Trans-Mississippi	78	68	53	37	31	26	58	42

[1] The rates to Marquette and Sault Ste. Marie do not include the dockage, this company having no docks at these points.

Average rates on iron ore, per long ton, from ports named to Ohio ports, 1885–1911.

Year	Escanaba.		Marquette.		Ashland and other head-of-lake ports.	
	Wild or daily rate.	Contract rate.	Wild or daily rate.	Contract rate.	Wild or daily rate.	Contract rate.
1885	$0.78	$0.90	$0.98	$1.05	$1.25	$1.15
1886	1.28	1.05	1.51	1.20	1.78	1.20
1887	1.59	1.40	1.87	1.63	2.23	2.00
1888	1.05	.90	1.30	1.15	1.43	1.25
1889	1.01	1.00	1.19	1.10	1.34	1.25
1890	.89	1.10	1.07	1.25	1.17	1.35
1891	.84	.65	1.02	.90	1.11	1.00
1892	.74	1.00	.98	1.15	1.15	1.25
1893	.56	.85	.71	1.00	.77	1.00
1894	.47	.60	.60	.80	.78	.80
1895	.73	.55	.92	.75	1.13	.80
1896	.52	.70	.66	.95	.77	1.05
1897	.45	.45	.55	.65	.57	.70
1898	.51	.45	.60	.60	.62	.60
1899	.95	.50	1.08½	.60	1.29¼	.60
1900	.69½	1.00	.78	1.10	.84½	1.25
1901	.64	.60	.79	.70	.89	.80
1902	.59	.60	.66	.70	.77	.75
1903	.61	.65	.72	.75	.81	.85
1904	.53½	.55	.62	.60	.70	.70
1905	.61	.60	.70	.70	.77	.75
1906	.60	.60	.70	.70	.75½	.75
1907	.60	.60	.70	.70	.75	.75
1908	.50	.50	.60	.60	.65	.65
1909	.52	.50	.61	.60	.66	.65
1910	.55	.55	.65	.65	.70	.70
1911	.45	.45	.55	.55	.60	.60

Charge to vessel in 1901 for trimming and unloading, 22 cents per ton; 1902, 19 cents per ton; 1903, 21 cents per ton; 1904, 19 cents per ton; 1905, 1906, 1907, 1908, 1909, 20 cents per ton; 1910 and 1911, 15 cents per ton. Wooden vessels requiring trimming paid an additional charge of about 3 cents per ton in 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, and 1911.

Average rates on hard coal from Buffalo and soft coal from Ohio ports to Lake Superior and Lake Michigan ports, 1892–1911.

Year.	Hard coal.		Soft coal.						
	Chicago.[1]	Duluth.	Milwaukee.[1]	Escanaba.	Duluth.	Green Bay.	Manitowoc.	Hancock-Houghton.	Sheboygan.
1892	59	43	58	43	43	55	49	.....	.....
1893	49	29	48	40	38	50	41	.....	.....
1894	46	25	48½	39	37½	49½	48	.....	.....
1895	59	24	54	39	36½	50	51	.....	.....
1896	36	24	33½	27	29	32½	32	.....	.....
1897	29	26	28½	29½	26	30	31	.....	.....
1898	28	23	28	26½	23	28½	28½	29.7	27.8
1899	73	49½	69	58	45⅓	66½	67	56.4	66.5
1900	48	39½	45	40	40	45	43½	41.3	43.6
1901	50	38	49	46	38	48½	48	39.5	45.3
1902	42	33	46½	41⅛	34½	46½	42	31.8	41.9
1903	48	38	50½	45	41½	50½	46	40.0	45.9
1904	43	34	47	40	37	45½	47	35.6	40.6
1905	44	34	46½	41½	33½	42	41½	35.3	41.525
1906	46	35	46	42	35	42	42	42.0	42.0
1907	40	31	40	35	30	35	35	50.0	35.0
1908	40	30	40	35	30	35	35	30.0	35.0
1909	41	32	37	31	31	32	31	31.25	31.25
1910	41	31½	35½	35	31	35	35	31.0	35.0
1911	35	30	32	31	32	31	31	32.0	31.0

[1] Rates to Milwaukee and Chicago are practically the same.

NOTE.—Coal of all kinds is shipped in short tons and handled without charge to vessels.

INTERSTATE COMMERCE COMMISSION,
DIVISION OF STATISTICS,
Washington, September 15, 1913.

Mr. F. N. STACY,
Holland House, New York, N. Y.

DEAR SIR: In reply to your inquiry of September 12, I regret to say that I have not yet been able to secure any data directly bearing upon the subjects of your inquiry. I inclose herewith a page from the December, 1911, Summary of Internal Commerce which gives (on p. 584) the average charges for trimming and unloading iron ore. I have consulted the dockets of several recent cases decided by the commission, viz:

Boileau Case, 22 I. C. C., 640;
Pittsburgh Vein Operators' Case, 24 I. C. C., 280;
Pittsburgh Steel Company, Opinion No. 2328;

and fail to find the data which you desire. The loading charges on coal from car to vessel vary between 5 and 10 cents per ton.

At the recent fifth annual convention of the International Fuel Association a paper was read on modern locomotive coaling stations, in which data are given showing the cost of installation, operation, and maintenance of various types of clam shells. By writing to the secretary of the association, Mr. C. G. Hall, 922 McCormick Building, Chicago, you may possibly procure a copy of the proceedings. I would also suggest that you communicate with the manufacturers of these shells for data regarding the practical operation of up-to-date unloading machinery. I have referred your inquiry to the tariff and accounting divisions of the commission and shall forward to you the results of their inquiries.

Respectfully,

M. JACOBSON,
Associate Statistician.

Average annual wheat rates by canal shipments between Buffalo and New York for the period 1888–1909 varied between 2.2 and 5 cents per bushel. The averages for the 1908 and 1909 seasons are given as 5 and 3.9 cents, respectively. (Average monthly and season rates are given in the Monthly Summary of Commerce and Finance, December, 1909, p. 1165.)

EXHIBIT XIII.

AMERICAN STEEL & WIRE CO.,
30 CHURCH STREET,
New York City, October 27, 1913.

Mr. F. N. STACY,
Holland House, Room 118, New York City, N. Y.

DEAR SIR: Referring to conversation had with our Mr. Kuhn with regard to proposed tramways, for transporting various materials between point of manufacture or production to canal wharves, would say that it is very difficult to give very close figures in the absence of definite data as to profile of the ground, showing the exact horizontal distances and elevations and exact requirements at terminal stations, but for preliminary figures would say that tramway having a length of half a mile, a capacity of 75 tons per hour or 750 tons per day of 10 hours, would cost approximately $7,500 to $8,000 for the material which we would furnish—which would include all the cables, traction rope, carriers, machinery, and metal work for the intermediate supports and terminal stations, including all bolts for erecting the structures and attaching the machinery, and complete set of working drawings for the erecting of the tramway.

To this should be added the cost of furnishing the necessary timber for all structures and the erecting of same in place and installation of our tramway material, as well as freight from our works to destination. This would make an additional cost of approximately $4,000 to $6,000, making the entire tramway installation cost in the neighborhood of $12,000 to $14,000 erected and ready to run.

As previously stated, these figures are very rough, and we believe if we had proper data so as to lay out tramway to fit the actual conditions we would be able to revise our figures and make them appear more favorable.

As to cost of operation, the various catalogues and pamphlets left with you will give you some idea in this regard, but for the particular tramway installation outlined above, would say, assuming that you wish to transport flour in sacks, which would require the greatest amount of labor at the tramway terminals, this cost would amount to approximately $27.10 per day, divided as follows:

	Per day.
Interest on the investment at 6 per cent	$5.60
Depreciation and maintenance, about 5 per cent on $9,000	3.00
Labor (including 1 foreman at $4, 6 laborers at $2 each)	16.00
Oil and grease	.50
Power, approximately	2.00

These figures are based on running the tramway for six months in the year, or for a total of 150 days, and based on a daily capacity of 750 tons the transportation charges would be 3.6 cents per ton. If it is desired to carry back freight over tramway, this could be done without any additional charge except possibly in the matter of power.

As stated by our representative, if our proposition should be favorably received and it was definitely decided to install this method of transportation, we would be pleased to make arrangements for one of our engineers to visit the proposed locations of tramway equipment and make any recommendations necessary for satisfactory and economical operation and installation as well as advising you as to the correct data to furnish for our requirements for making up the necessary estimates and drawings.

There are over 3,000 Bleichert aerial tramways in successful operation throughout the world—in capacities ranging from a few hundred pounds to 250 tons per hour, with lengths of lines varying from a few hundred feet up to 22 miles, and with operating costs running from 1 to 5 cents per ton per mile—and from the fact that we have been able to install this number of tramways and give complete satisfaction both as to operation and maintenance leads us to believe that there is no question but what we could furnish equipments for your requirements which would give you the same service and satisfaction.

We shall, therefore, look forward to hearing further from you with regard to these proposed improvements, and assuring you of our prompt and careful attention to all inquiries, we are,

Your, truly,

AMERICAN STEEL & WIRE CO.,
W. E. CORNE, *Sales Agent.*

EXHIBIT XIV.

JOINT RESOLUTION Memorializing Congress in favor of a canal connecting Lake Superior with the Mississippi River via the Brule and St. Croix Rivers, and providing for the appointment of a commission to promote the construction thereof and to act in conjunction with commissions appointed by other States.

Whereas the Congress of the United States, by two several and separate acts, passed in the years eighteen hundred and ninety-four and eighteen hundred and ninety-nine, authorized and directed two separate surveys and examinations of three proposed routes for a canal connecting Lake Superior with the Mississippi River, one of said routes being from Lake Superior to the Mississippi River via the Saint Louis River, one via the Rum River and one via the Brule and Saint Croix Rivers; and

Whereas after an actual examination and survey of said several proposed routes, the United States Government engineers did report in the year 1894 that the most feasible route for said canal is the route from Allouez Bay on Lake Superior via the Brule and Saint Croix Rivers to the Mississippi River, and recommended said route; and

Whereas in the year eighteen hundred and ninety-nine the United States Government engineers did again report that a canal from Lake Superior to the Mississippi River via the Brule and Saint Croix Rivers was entirely feasible; that in the first of said reports of said Government engineers it was estimated that said canal could be constructed seven feet deep, eighty feet in width at the water surface, and fifty-nine feet in width at the bottom thereof, for the sum of $7,059,000; and in the second of said reports it was estimated that said canal could be built eighty feet in width at the water line, fifty-nine feet in width at the bottom, and five feet deep, for the sum of $6,012,500; and

Whereas the project of constructing said canal has not been authorized by Congress because of reports of said engineers to the effect that the construction of said canal was not warranted owing to existing railroad competition and the cost of said canal as compared with the benefits to be derived from the construction thereof; and

Whereas it conclusively appears from the surveys and examinations of the route made by the Government engineers that it is entirely feasible and practicable to construct and operate said canal along the route specified from Allouez Bay on Lake Superior via the Brule and Saint Croix Rivers to the Mississippi at the junction of the Saint Croix and Mississippi Rivers, and the only objections which apparently prevent Congress from authorizing said project are the existence of railway competition and the doubt expressed by said engineers as to the amount of commerce which would be carried upon said canal; and

Whereas no survey or examination appears to have been made or authorized by the United States Government of said route to ascertain whether the same could be constructed and operated at a depth of ten feet, nor as to whether a canalization of the Mississippi River by the construction of a dam below the junction of the Saint Croix and Mississippi Rivers would be practical which would in fact extend said waterway so as to connect the cities of Minneapolis and Saint Paul with the cities of Duluth, Minnesota, and Superior, Wisconsin, by means of said canal and the canalization of said Mississippi River; and

Whereas millions of consumers and producers of the Northwest and the Mississippi Valley are vitally interested in the construction of said canal and the improvement of said Mississippi River so as to form a complete and continuous inland waterway from the Mississippi Valley and the Twin Cities to the Atlantic seaport via the Great Lakes, thus enabling all of the products of the Eastern States and the States bordering on the Great Lakes to be shipped by water to all points in the Northwest and the Mississippi Valley and the agricultural and other products of the Northwest to be shipped by water to the markets of the world; and

Whereas at all of the hearings held upon the question of the commercial necessity of said canal and waterway a great mass of producers and consumers interested have had no adequate opportunity to be effectively heard, and there is no lawfully constituted authority, official, or commission of this State authorized or empowered to ascertain and present the facts or collect data and statistics relating to commerce bearing upon this important subject; and

Whereas the State of Wisconsin and the people of said State are also greatly interested in the construction of said canal and waterway: Now, therefore be it

Resolved by the House of Representatives of the State of Minnesota (the Senate concurring), That the construction of said canal by the National Government is of the greatest importance to this State, the State of Wisconsin, the Mississippi Valley, and the Nation; that its construction will be a great national addition to existing facilities of commerce; and it would constitute a natural, adequate, and automatic means of reducing transportation rates on all commodities between the Mississippi Valley, the great Northwest, the Great Lakes, and the Atlantic seaports, and that it would tend to reduce rates upon coal, iron, steel, manufactured articles, grain, and other agricultural products and would greatly benefit the consumers and producers of the East and the West and reduce the cost of the necessities of life.

Resolved further, That the governor of this State, the drainage engineer of this State, the chairman of the board of railroad and warehouse commissioners be, and they are hereby, appointed a commission, of which the governor shall be chairman, which shall be known as the Lake Superior and Mississippi River Canal Commission, and said commission is hereby granted power and authority and is hereby directed to investigate and ascertain all of the facts with reference to practicability and cost of construction and operation of said canal, utility thereof, and the character and amount of commerce which would probably be carried or affected by said canal, and the probable effect of the construction and operation thereof upon transportation rates and upon the consumers and producers of the Northwest, and especially the States of Minnesota and Wisconsin: *Provided, however*, That the expenses of such commission in carrying out the provision hereof shall not exceed the sum of $2,500. Said commission is hereby directed to lay before the United States engineers and

any other Federal commission, board, or authority having jurisdiction of any question relating to the construction of said canal by the United States Government all of the facts, conclusions, statistics, data, information, and views ascertained and gathered by said commission bearing upon the advisability and practicability of the construction of said canal by the Federal Government, and to make or cause to be made any and all arguments deemed necessary by said commission in favor of said canal, and to use their best efforts to further the project of the construction thereof, and to report to the legislature at the session of nineteen hundred and fifteen all of their acts and doings in the premises.

Resolved further, That said commission is also authorized and directed to confer and act with any commission designated or appointed with the State of Wisconsin, or any other State interested in the construction of said canal, and to act with any such commission in any and all of the matters hereinbefore set forth.

Resolved further, That the State of Wisconsin is hereby requested and invited to constitute and appoint a like commission for the purpose of consulting and cooperating with said commission hereby appointed for the purpose of furthering the project of constructing said canal.

Resolved further, That the Senators and Representatives in Congress of the United States for the State of Minnesota are hereby requested to urge upon Congress the adoption of an act authorizing the final survey of said canal at a depth of ten feet, together with the extension of said canal by means of the canalization of the Mississippi River to the cities of Saint Paul and Minneapolis, and to urge upon Congress the final construction of said canal by the United States Government.

Resolved further, That a copy of this resolution be sent to the Senate and House of Representatives of the United States and to each of the Senators and Representatives in Congress from this State, and that a like copy be transmitted by the governor of this State to the governor of Wisconsin and to the president of the senate and speaker of the Assembly of the State of Wisconsin.

Approved, March 31, 1913.

Exhibit XV.

Chapter 651.—AN ACT Creating the Lake Superior and Mississippi River Canal Commission, prescribing its duties, and creating section one hundred and seventy-two—one hundred and twenty-one of the statutes, making an appropriation.

The people of the State of Wisconsin, represented in senate and assembly, do enact as follows:

Section 1. There is created a commission to be known and designated as the Lake Superior and Mississippi River Canal Commission. Such commission shall consist of three members, to be appointed by the governor within thirty days after the passage and publication of this act.

Sec. 2. Such commission shall, within forty days after the passage and publication of this act, organize by choosing one of its members as president and one as secretary.

Sec. 3. It shall be the duty of the Lake Superior and Mississpipi River Canal Commission, hereby created, and said commission is hereby granted power and authority to investigate and ascertain all the facts with reference to the practicability and the cost of construction and operation of a canal from Lake Superior to the Mississippi River via the Brule and Saint Croix Rivers, the utility thereof for the purposes of creating water power and the character and amount of commerce which would probably be carried or affected by said canal, and the probable effect of the construction and operation thereof upon transportation rates and upon the consumers and producers of the Northwest, and especially the States of Minnesota and Wisconsin. Said commission is hereby directed to lay before the United States engineers and any other Federal commission, board, or authority having jurisdiction of any question relating to the construction of said canal by the United States Government all of the facts, conclusions, statistics, data, information, and views ascertained and gathered by said commission bearing upon the advisability and practicability of the construction of said canal by the Federal Government, and to make or cause to be made any and all arguments deemed necessary by said

commission in favor of said canal, and to use their best efforts to further the project of the construction thereof.

SEC. 4. The said commission is also authorized and directed to confer and act with any commission or other body designated or appointed by the State of Minnesota, or any other State interested in the construction of said canal, and to act with any such commission or other body in any and all of the matters set forth in section three of this act. Said commission shall, after its organization, notify any such commission or other body designated or appointed by any other State of such organization and its desire to cooperate with such commission or other body, and shall thereafter act as herein provided.

SEC. 5. Said commission shall report its acts and doings to the governor, from time to time as he may request and shall report to the next session of the legislature all of its acts and doings, with such recommendations for further legislation as it may deem expedient.

SEC. 6. The members of said commission shall serve without salary, but shall be paid their actual expenses necessarily incurred in the performance of their duties under this act. All payments under this section shall be made on proper vouchers signed by the president and secretary of said commission.

SEC. 7. There is added to the statutes a new section to read:

"SEC. 172–121. There is appropriated on July first, nineteen hundred and thirteen, the sum of $2,500, payable from any moneys in the general fund not otherwise appropriated, for the Lake Superior and Mississippi River Canal Commission to carry out the provisions of this act."

SEC. 8. This act shall take effect and be in force from and after its passage and publication.

Approved, July 21, 1913.

APPEAL OF MINNESOTA AND WISCONSIN CANAL COMMISSIONS TO THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS, WASHINGTON, D. C., IN THE MATTER OF LAKE SUPERIOR-MISSISSIPPI CANAL—SUPPLEMENTAL DATA AND ARGUMENT FOR CONSTRUCTION OF CANAL.

(June 13, 1914.)

[George H. Sullivan, Stillwater, Minn., counsel for Minnesota Canal Commission; E. F. Ackley, Chippewa Falls, Wis., counsel for Wisconsin Commission.]

PROJECTED CANAL FROM LAKE SUPERIOR TO MISSISSIPPI RIVER VIA BRULE AND ST. CROIX RIVERS.

SUPPLEMENTAL STATEMENT.

Should the Lake Superior-Mississippi River Canal be constructed by the United States?

It is conceded that the answer to the foregoing question depends upon the favorable solution of two problems:

1. Is it physically practicable to construct and operate such canal?
2. Is the proposed canal commercially feasible?

It is entirely practicable to construct and operate the canal.

It was freely conceded by the local board of the United States Army Engineers that it is easily practicable and feasible from a physical and engineering standpoint to construct and operate the canal. This conclusion of the local board rests upon the authority of all United States Government engineers who have examined the proposed route, its physical characteristics, water supply, etc. Not only is the construction and operation of the canal feasible and practicable, but it presents no unusual or difficult engineering or operating problem.

COMMERCIAL FEASIBILITY.

Is the proposed canal commercially feasible, or, as this problem is stated by the local board, will the operation of the canal result in saving the public in reduced freight rates $420,000 per annum?

This problem presents the following factors:

1. At what rate will the canal carry freight?
2. What amount of tonnage will be available for canal transportation in 1920 when the canal will be ready for operation?
3. Will the construction of the canal result in a saving on freight rates between the head of the Lakes and Twin City territory?
4. Will the total saving equal $420,000 per year?

CANAL RATE.

We have shown in our original argument that on the Erie Canal, operating under extremely unfavorable conditions as to cost of transportation, such as failure to keep canal in repair, resulting in reduced depth of channel; use of ancient type of canal boat—maximum 240-ton capacity—with animal motive power; entire absence of modern terminal facilities; canal traffic controlled by railways, preventing canal from securing through freight; it was during a period when improvement in type of barge or character of motive power could not be made because the fate of the canal was uncertain—the average rate was 2 mills per ton-mile.

We have shown in our original argument that with the favorable conditions that would necessarily obtain at the time of the opening of the projected canal, including modern terminals with adequate facilities for handling freight, self-propelled modern type of canal boat having capacity of 550 tons, canal free from railway domination or control, the rate for the projected canal should be much less than 2 mills per ton-mile on the average, and that upon coal it should not exceed 1½ mills per ton-mile—one authority, John H. Bernhard, placing the coal rate as low as 25 cents per ton.

We therefore confidently assert that it is safe and conservative to conclude that the average rate on the projected canal would not exceed 2 mills per ton-mile, especially in view of the immense volume of tonnage hereafter shown to be available to the canal at the moment it is ready to operate. Coal can be and will be carried on the canal at 1½ mills per ton-mile at the highest.

Unwarranted extra handling charges of freight transported by canal used by local board to defeat commercial feasibility of canal.

In their comparison of the respective costs of transportation via rail and canal the local board not only assumes an average canal rate of 3 mills per ton-mile or 78 cents per ton, which is 28 cents per ton in excess of the rate calculated at 2 mills per ton-mile, which we have shown to be the proper rate; but, in addition thereto, in order to make a finding that it is impossible to transport any freight on the canal, the board adds to the canal rate various handling charges for which there is little, if any, basis in fact, such as 25 cents per ton for unloading coal from the canal barge to the dock by clamshell; 25 cents per ton deterioration; 25 cents per ton for delivery from dock to carload consumer; elevator charges on grain at Twin Cities, 25 cents per ton; and at Duluth, 25 cents per ton; handling charges on flour at Duluth, 22 to 33 cents per ton; handling charge for general merchandise 25 cents per ton; the same charges on iron and steel; and 44 cents charges per ton on coarse grain at Duluth.

As shown in our original argument, most of the foregoing charges do not exist and there is no reliable commercial or other authority for them. It only costs 5 cents per ton to take the coal from the lake vessels, put it on the dock, screen it, and load it into the cars. This operation can be done as cheaply at the Twin Cities. (See the testimony of Julius Barnes, hereinafter quoted. Deterioration of coal in one handling by clamshell is too small to be commercially noticeable (original argument). Elevator charges on grain at Twin Cities and Duluth must be paid whether transported by rail or by canal; handling charges on flour at Duluth must be paid when carried by rail and transferred to a lake vessel, and such charges, with modern terminals, should not exceed 6 cents per ton. The general merchandise handling charges should not exceed 6 to 10 cents per ton.

TRANSPORTATION BY CANAL INVOLVES AT MOST ONLY ONE EXTRA HANDLING CHARGE.

Any fair comparison of the various operations necessary in the transportation of commodities from the Great Lakes to the Twin Cities, or vice versa, between canal and rail transportation, demonstrates that at the most there

can be but one additional handling of freight in canal transportation that is not also required in rail transportation of the same commodity.

Take the case of coal, for instance. The only additional handling of coal—in order to deliver the same to Twin City consumers when transported by canal—is to take the coal from the lake carrier and place it in the canal barge. When the coal reaches the Twin Cities it occupies exactly the same relative position to further transportation as the same coal did originally when in the hold of the carrier at Duluth. It must be taken from the barge by coal-handling machinery and deposited in an adjacent coal yard or loaded into cars in exactly the same manner as would be necessary at Duluth. So that such coal is properly chargeable with only the cost of taking the coal from the lake carrier and placing it on the barge. This can be done by elevating the coal to a coal pocket in the dock with a chute running down it suitable to deliver the coal by gravity to the barges as called for. The figures are given for the cost of this operation as ranging from 3 to 6 cents per ton. We think it is conservative to add a charge of 5 cents.

When coal is transported from Duluth to the Twin Cities by rail, as at present, it is delivered on the sidetrack to carload consumers without additional switching charges, although, under recent rulings of the Interstate Commerce Commission, undoubtedly shippers, in the near future, will be required to pay an extra charge for similar switching. A small proportion (but not over 50 per cent) of the Twin City consumers take coal in carload lots on the sidetrack. A switching charge from the dock to the sidetrack of $2 per car would cover such consumption, making a net charge of 2½ cents per ton on all coal shipped. However, all coal shipped from Twin Cities to southern, southwestern Minnesota and South Dakota points would not carry the extra 2½ cents per ton.

As to grain shipped from the Twin Cities to Duluth, practically none is cleaned at country elevator points and therefore upon receipt at Twin Cities goes into elevators to be cleaned and mixed with other grain to give it a higher grade. Once being in an elevator at the Twin Cities, whether it is shipped via rail or canal, makes no difference in the elevator charge. All grain going into elevators in the Twin Cities will take the same charge whether delivered from the elevator to cars or canal boats. To charge grain for an extra handling at the Twin Cities is unwarranted except as to the small proportion thereof which is not placed in an elevator at the Twin Cities.

From the statement of the local board it would appear that grain transported by canal to Duluth would take an extra elevator charge at Duluth for being transferred from canal boat to lake carrier and that such elevator charge would not also be applicable to grain transported by rail. This is absolutely inaccurate and is not and can not be justified from any standpoint or by any authority.

All grain arriving at Duluth by rail must pay the elevator charge for being transferred to lake vessels.

FLOUR.

Flour is now loaded by hand trucks from mill to car and the local board makes no charge against rail on this account. Flour can be loaded from mill to canal boat at a cost no greater than the present cost of loading cars.

All flour shipped by rail to Duluth is charged 16 cents per ton for transfer from car to lake vessel. As will be hereafter seen, flour can be handled by modern terminal facilities from canal boat to lake vessel for 6 cents per ton.

General merchandise is charged 25 cents per ton extra for delivery from lake vessel to canal boat. This charge should not exceed 6 cents per ton, as shown by the testimony of Julius Barnes, hereinafter quoted, and by reference to similar charges at New Orleans and San Francisco, hereinafter quoted.

If proper terminals are provided at each end of the canal, it is clear that freight transportation via canal involves only one extra handling and that the canal with modern terminals will reduce all handling charges of freight between the lakes and the Twin Cities from the present rates as well as reducing the present rail rates.

Therefore, in any comparison of rail and canal transportation only one handling charge should be added to the canal rate, and, as seen, the effect of canal construction with its modern terminals would be to more than offset the present handling charges by rail.

The testimony of Julius Barnes, hereinafter quoted, shows that present handling charges from lake vessel to car or car to lake vessel on general merchandise is from six to fourteen times more than will be the case when the canal is built and modern terminals installed. Then handling charges involved in rail transportation will be much higher upon all commodities, except coal and grain, than like handling charges in connection with canal traffic. So that assuming the construction of modern terminals in connection with the canal—and we guarantee such construction—practically all of the handling charges assumed by the local board will be eliminated. Indeed, there will be a net reduction in the handling charges unless similar terminals are also constructed at Duluth for transfer from lake to rail, and in such event the handling charges to be debited to the canal, as compared with rail, will be too small a factor to affect the problem.

AVAILABLE TONNAGE.

The local board found from railway statements (sec. 31) that the actual coal, iron, and flour shipments in the year 1912 were as follows:

	Tons.
Coal and iron	1,954,568
Flour	223,170
Total	2,177,738

The board accepted as true the railway statement that the above constituted 80 per cent of the total freight shipments for 1912. Therefore the board must have found the total actual shipments for 1912 to be 2,722,171 tons. (See sec. 32–40.)

The board then made an estimate of the tonnage to be added to the actual shipments for 1912 by adding certain percentages to the actual shipments of coal, iron, flour, etc., on account of the added consumption of the Canal Zone and territory tributory thereto. The result of such computations was that the board found the total actual and estimated tonnage available to the canal for 1912 to be 3,295,000 tons (sec. 41). It will be seen, therefore, that the board added to the total actual shipments 522,829 tons for the amount they estimated the shipments should be increased on account of increased territory. This was an addition of 20.3 per cent to the actual tonnage for 1912 according to railway statistics.

As shown by the statement of the railways to the Minnesota Railroad and Warehouse Commission (original argument), the correct actual total tonnage for the year 1912 was 3,484,163 tons. Following the exact method followed by the local board in order to arrive at the total actual and estimated tonnage available for shipment on the canal in the year 1912 would require the addition of 20.3 per cent to the total actual shipments for 1912, or 707,285 tons.

This would give us, according to the method of the local board, a total—actual and estimated—of 4,191,448 tons available to the canal for the year 1912.

Dividing this total according to the method applied by the local board (sec. 41) we have:

	Per cent.	Tons.	Present rail rate.
Soft coal	52.3	2,192,127	$0.96
Hard coal	20.0	838,290	1.20
Iron and steel	.1	4,191	1.40
Flour	7.6	318,550	1.16
Grain	10.0	419,145	1.00
General merchandise	10.0	419,145	1.16
		4,191,448	

NOTE.—The rates on soft coal and flour increased from 90 cents and $1 to above figures since the report of the local board; rate on hard coal decreased from $1.25 to $1.20.

It appears from the reports of the railways to the Minnesota Railroad and Warehouse Commission, as shown in the original argument, that shipments between canal termini have increased since 1909 at the rate of 15 per cent per

annum. If such increase continues until 1920 it would make an increase over the year 1912 of 120 per cent. This would increase the total tonnage available in 1920 to 9,221,285 tons, which, divided according to the percentages applied by the local board above noted, would show the following result:

	Per cent.	Tons.		Per cent.	Tons.
Soft coal	52.3	4,822,732	Flour	7.6	700,818
Hard coal	20.0	1,844,257	Grain	10.0	922,128
Iron and steel	.1	9,222	General merchandise	10.0	922,128

It is not unreasonable to assume that the available tonnage will increase at approximately the same rate of increase noted between the years 1909 and 1913, but we find that if such rate of increase be discounted one-third, nevertheless the total tonnage available can not possibly fall short of 8,000,000 tons. This would seem to dispose of the question of total tonnage available to the canal at the time it may be expected to be ready for business. Therefore it is beyond question or doubt that the volume of tonnage available to the canal when constructed will be sufficient so that at the canal rates herein shown there will be a saving to the public of a great deal more than $420,000 per annum, and the canal is commercially feasible.

CEMENT.

It is stated upon reliable authority that the first unit of cement production at the new steel mills in Duluth will provide for a production of 1,000,000 tons per annum, and unquestionably the Twin Cities and territory included in the Canal Zone will use cement manufactured at the head of the Lakes. Other factors noted in the original argument, will tend rather to increase the total tonnage available rather than to decrease it, so it is conservative to estimate that the above totals will be increased rather than decreased.

The canal is commercially feasible on the basis of the 1912 actual and estimated tonnage.

COAL.

We have seen that on the basis of total and actual shipments for 1912 the total coal available would be:

	Tons.
Soft coal	2,192,127
Hard coal	838,289

Rail rate.

Soft coal	$0.96
Hard coal	1.20

	Per ton.
Assuming the canal rate to be 1½ mills per ton-mile	$0.37½
Unloading lake carrier and loading barge	.05
Delivery to sidetrack or carload consumers (only small part, not exceeding 50 per cent so delivered—cost 5 cents per ton on 50 per cent)	.02½
Total cost per ton via canal	.45

Saving to public.

Soft coal, 51 cents per ton	$1,117,984.77
Hard coal, 75 cents per ton	628,716.75
Total saving on coal	1,746,701.52

	Per ton.	
Assuming the canal rate to be 2 mills per ton-mile	$0.50	
Unloading lake carrier and loading barge	.05	
Delivery	.02½	
Total cost per ton via canal	.57½	

Saving to public.

Soft coal, 38½ cents per ton	$843,968.89
Hard coal, 62½ cents per ton	523,930.62
Total saving on coal	1,367,899.51

	Per ton.	
Assuming the canal rate to be 2½ mills per ton-mile	$0.62½	
Unloading lake carrier and loading barge	.05	
Delivery	.02½	
Total cost per ton via canal	.70	

Saving to public.

Soft coal, 26 cents per ton	$569,953.02
Hard coal, 50 cents per ton	419,144.50
Total saving on coal	989,097.52

	Per ton.	
Assuming canal rate to be 3 mills per ton-mile	$0.75	
Unloading lake carrier and loading barge	.05	
Delivery	.02½	
Total cost per ton via canal	.82½	

Saving to public.

Soft coal, 13½ cents per ton	$295,937.14
Hard coal, 37½ cents per ton	314,358.37
Total saving on coal	610,295.51

FLOUR.

Total flour available 1912, 318,550 tons; rail rate, $1.16.

	Per ton.
Assuming canal rate to be 1½ mills per ton-mile	$0.375
Mill to barge	.036
Unloading and loading at Duluth	.08
Total cost per ton via canal	.491

Saving to public, 318,550 tons, at $0.669 per ton, $213,109.95.

	Per ton.
Assuming canal rate to be 2 mills per ton-mile	$0.50
Mill to barge	.036
Unloading and loading	.08
Total cost per ton via canal	.616

Saving to public, 318,550 tons, at $0.544 per ton, $173,291.20.

	Per ton.
Assuming canal rate to be 2½ mills per ton-mile	$0.625
Mill to barge	.036
Unloading and loading	.08
Total cost per ton via canal	.741

Saving to public, 318,550 tons, at $0.419 per ton, $133,472.45.

	Per ton.
Assuming canal rate to be 3 mills per ton-mile	$0.75
Mill to barge	.036
Unloading and loading	.08
Total cost per ton via canal	.866

Saving to public, 318,550 tons, at $0.294, $93,653.70.

NOTE.—A charge of 3.6 cents per ton is added for delivery of flour from mill to barge, which should be offset by present cost of loading from mill to car. Also 8 cents per ton from canal boat to lake carrier is 2 cents per ton more than warranted by testimony of Julius Barnes, San Francisco and New Orleans charges.

GENERAL MERCHANDISE.

Total general merchandise available, 419,145 tons; rail rate, $1.16.

	Per ton.
Assuming canal rate to be 1½ mills per ton-mile	$0.37½
Handling charge, boat to barge	.10
Total cost per ton via canal	.47½

Saving to public, 419,145 tons, at $0.68½ per ton, $287,114.32.

	Per ton.
Assuming canal rate to be 2 mills per ton-mile	$0.50
Handling charge, boat to barge	.10
Total cost per ton via canal	.60

Saving to public, 419,145 tons, at $0.56 per ton, $234,721.20.

	Per ton.
Assuming canal rate to be 2½ mills per ton-mile	$0.62½
Handling charge	.10
Total cost per ton via canal	.72½

Saving to public, 419,145 tons, at $0.43½ per ton, $182,328.07.

	Per ton.
Assuming canal rate to be 3 mills per ton-mile	$0.75
Handling charge	.10
Total cost per ton via canal	.85

Saving to public, 419,145 tons, at $0.31 per ton, $129,934.95.

VOLUME OF GENERAL MERCHANDISE.

Julius Barnes, traffic expert, who made a statement to the local board, estimates in his statement before the House Committee on the Merchant Marine, hereinafter referred to, that the volume of general merchandise traffic on the Great Lakes would increase tenfold if handling charges from boat to rail and from rail to boat were made to conform to average charges at New Orleans and San Francisco, where modern terminals have reduced handling charge on freight to an average of 5 to 6 cents per ton.

GRAIN.

Rail rate, $1.

	Per ton.
Assuming canal rate to be 2 mills per ton-mile	$0.50
Elevator charges, Twin Cities	.25
Total cost, per ton via canal	.75

Saving to public, 419,145 tons, at 25 cents, $104,786.25.

	Per ton.
Assuming canal rate to be 1½ mills per ton-mile	$0.37½
Elevator charges	.25
Total cost per ton via canal	.62½

Saving to public, 419,145 tons, at 37½ cents, $157,179.38.

The statements of the local board in sections 70–76 relative to grain would indicate that elevator charges at Duluth should be added to the canal rate; but this is absolutely incorrect. All grains going to Duluth by rail must pay elevator charges at Duluth in addition to rail rate. There is no lake-and-rail rate on grain.

Unquestionably a much greater grain tonnage will be shipped via Duluth after construction of the canal on account of lower rate.

Summary of saving on basis of actual and estimated shipments for the year 1912, at various canal rates per ton-mile.

	3 mills.	2 mills.	1½ mills.
Coal	$610,295.51	$1,367,899.51	$1,746,701.52
Flour	92,653.70	173,291.20	213,109.95
Grain		104,786.25	157,179.38
General merchandise	129,934.95	234,721.20	287,114.32
Iron and steel	2,305.05	3,352.80	3,876.68
Total	836,189.21	1,884,050.96	2,407,981.85

Therefore it appears that even on the basis of the available tonnage for the year 1912 the canal is commercially feasible in that it will save more than $420,000 per year. But we have seen that the available tonnage is increasing at the rate of 15 per cent per annum; that it is improbable to suppose that the canal could be completed until 1920. It is therefore conservative and reasonable to add 120 per cent to the figures of the savings shown for 1912, which gives the following total saving:

At various canal rates per ton-mile.

	3 mills.	2 mills.	1½ mills
Coal	$1,342,550.12	$1,641,479.41	$3,842,743.34
Flour	203,838.14	381,240.64	468,841.89
Grain		230,529.75	345,794.63
General merchandise	285,856.89	516,386.64	631,651.50
Iron and steel	5,071.11	7,376.16	8,528.69
Total	1,837,316.26	2,777,012.60	5,297,560.05

CRITICISM OF METHODS OF LOCAL BOARD IN DETERMINING CANAL NOT COMMERCIALLY FEASIBLE.

We assert that the method used by the local board at section 45 of their report, for the purpose of discussing the commercial availability of the canal, is productive of nothing but confusion. In this connection the local board say:

"For the purpose of discussion several cases will be assumed (1) that the canal operating for seven months of the year will carry all the present freight, or 3,295,000 tons; (2) that the canal will carry 50 per cent of the entire freight, or 1,647,500 tons; (3) that the canal will carry 18 per cent of the entire freight, as the Erie Canal did in 1880, or 593,100 tons; (4) that the canal will carry 3 per cent of the entire freight, as the Erie Canal did in 1906, or 98,850 tons; (5) that the canal will carry all freight except coal; (6) that the canal will carry all freight except soft coal; (7) that the canal will carry all grain and flour northward and all hard coal southward.

"(*a*) *Cost to the United States.*—The canal to be commercially justified must save to the public at least $420,000 per annum, an amount equivalent to a reduction of the selling price of the freight handled under the various conditions as follows:

(1) 3,295,000 tons	$0.13
(2) 1,647,500 tons	.25
(3) 593,000 tons	.71
(4) 98,000 tons	4.25
(5) 912,800 tons	.46
(6) 1,571,000 tons	.27
(7) 1,239,100 tons	.34

Not one of the entire seven assumed cases set forth by the local board in this portion of their report has any application whatever to the problem of the commercial feasibility of this particular project.

As to the first case it assumes that the canal will carry all freight. We do not claim it. We claim it will affect all freight rates by materially reducing them.

As to the second case, that the canal will carry 50 per cent of the entire freight, there is no basis for us to claim that percentage more than any other.

As to the third and fourth cases, there is no possible basis for the assumption that the canal will carry 18 per cent of the entire freight, as the Erie Canal did in 1880, nor that it will carry 3 per cent, as the Erie Canal did in 1906.

Neither is there any basis for the assumed case that the canal will carry all freight except coal. This case is the most unfavorable to the canal that could be assumed, because, as shown in our original argument, coal, both hard and soft, is peculiarly adapted to transportation by canal; that it forms 90 per cent of the tonnage on some of the most important canals in Europe. If the proposed canal will not carry coal, it will not carry anything, and to assume a case that the canal will carry all freight except coal is absolutely unfair to the canal. The importance of coal to the commercial feasibility of this canal is demonstrated by the actual figures hereinbefore quoted.

That the canal will carry all freight except soft coal is likewise, and for the same reasons given last above, unfair to the canal. If the canal will not carry soft coal at a saving it probably is not commercially feasible.

For the reasons above given with reference to the other cases assumed, the last case assumed by the local board that the canal will carry all grain and flour northward and all hard coal southward, is absolutely unfair. It is wholly artificial and the whole method of dividing the canal tonnage into the assumed cases mentioned in section 45 is artificial, without any basis or foundation in fact, and is a method of reasoning wholly unsuitable and inconclusive as to the problem presented. It is on a par with the statement of the local board at section 65 of their report that coal used for Government purposes will not move by the canal because there is a land-grant rate of 50 per cent on Government freight.

FAIR METHOD OF DETERMINING COMMERCIAL FEASIBILITY.

The only fair and reasonable method of determining the commercial feasibility of the canal is to determine the total available tonnage at the time the canal is completed, divide the tonnage so found into the various classes, such as soft coal, hard coal, iron, steel, cement, flour, and general merchandise, ascertain the rail rate upon each such commodity, and find the total freight paid at the present time to the railways. Then ascertain the canal rate as to each item and commodity to be transported; if there be a saving, subtract it from the rail rate and multiply it by the tonnage as to each commodity, and if the total saving equals $420,000 per annum, or if such amount should be found to equal the interest and maintenance charges, then the canal should be determined to be commercially feasible.

The local board also seem to be inclined to credit the canal with freight actually transported on the canal and not to credit the canal with any saving in any instance when the freight is transported by rail, even though carried at less than present freight rates, notwithstanding the reduction in freight rate be caused solely by the canal. We can not agree with this theory. It is our contention that if the canal can haul any commodity at less than present rail rates this necessarily results in a public saving of the difference between present rail rates and canal rates and that the canal should be given credit for the whole amount saved on such freight moving in canal territory, whether the same be actually carried by canal or partly by rail or wholly by rail. It is quite possible and perhaps probable that the railways will meet canal competition by making rates which will be so low as to be noncompensatory as to the railways. It is not the object of the canal merely to reduce freight rates, but it is the bona fide object and purpose of such canal to actually transport freight at a considerable reduction from present freight rates and effect a large public saving. How is it possible for us to guess at what the railways will do when the canal demonstrates its ability to haul freight at less than existing rail rates? The question which lies at the root of the construction of the canal is whether such construction will result in saving to the public a large amount of money each year by reason of the fact that water transportation via canal is essentially and inher-

ently more economical and cheaper than rail transportation. If such be the fact, and the difference between rail and canal transportation per ton is sufficient when multiplied by the total tonnage so that the investment of the United States Government is a profitable one from the standpoint of public saving, it seems to us that the question of what the railways may do about reducing their rates or may undertake by other methods to meet or destroy canal competition is entirely outside of the present problem. That is a problem which properly addresses itself to Congress and to the executive authority for solution. We judge from the present temper of public opinion and from the investigations made by committees of Congress and from the present trend of legislation, that the question will be solved in such a way as to permit waterways to carry on their natural and normal functions.

We therefore submit that the canal should be credited with all reductions in freight from existing rail rates caused or produced by the construction and operation of the canal, whether such freight is actually carried on the canal or otherwise.

ELEVATOR CHARGES AT DULUTH ON GRAIN SHOULD NOT BE ADDED TO CANAL RATE.

Statements of the local board in reference to handling charges on wheat and coarse grains, found in sections 70 to 76, inclusive, and at section 89, where such elevator charges are added to the canal rate on wheat and coarse grains producing a rate so high that neither wheat nor grain will move via the canal, are misleading. Such statements are made in a manner which might induce the belief that shipments of grain from the Twin Cities via Duluth to Buffalo are made on a lake-and-rail rate and that the rail rate of $1 per ton to Duluth includes elevator charges at the Twin Cities and Duluth and transfer of grain to lake carrier at Duluth. The fact is there is no lake-and-rail rate on wheat or grain from the Twin Cities to Buffalo or New York or other eastern points. Every shipment of wheat or grain from or through the Twin Cities or elsewhere to Duluth and to the east via the Great Lakes must pay in addition to the rail rate of $1 per ton from the Twin Cities to Duluth and in addition to freight charged on lake steamer the elevator charges at the Twin Cities and at Duluth and Buffalo.

INCREASE IN GRAIN SHIPMENTS.

If our statement is right that the canal rate will not exceed 2 mills per ton-mile on grain, the rate from the Twin Cities to Duluth should be 50 cents per ton, or 1½ cents per bushel less than the present rail rate of 3 cents per bushel. There will be a proportionate reduction in grain rates from all Mississippi River points. And whereas under present conditions and rates there have been large exports of wheat and grain from the Twin Cities and Twin City territory to easterly points via Duluth, the decreased canal rate will necessarily increase the area from which such shipments will move which will logically result in a very greatly increased volume of such grain shipments.

With the completion of the Erie Canal in 1915 or 1916 the grain outlet from Duluth to the seaboard will be all water and entirely free from railway control, resulting in a cheaper rate from Twin City and Mississippi River territory to the seaboard. This factor will largely increase the area tributary to the Twin Cities and Mississippi River from which grain will move east via Duluth, and proportionately enlarge the volume of grain available for canal shipment.

FLOUR.

The rail rate quoted on flour by the local board from Minneapolis to Duluth is $1 per ton, but the Railroad and Warehouse Commission of Minnesota on June 27, 1914, state such rate to be $0.058 per hundred or $1.16 per ton.

In arriving at the conclusion that the canal will not carry flour (sec. 81) the local board say it will cost 22 cents per ton to transfer flour from barge to steamer at Duluth, which, added to the canal rate of 78 cents, leaves nothing for public saving. In section 81 the local board states the cost of such transfer of flour as 33 cents per ton. The local board then state:

"The vessels carrying flour on the Great Lakes are railroad-owned; the railroads need flour as freight, particularly in winter; they are convenient to the mills at Minneapolis and the docks at Duluth; and who can be so filled with optimism as to believe that flour would be transported by canal to Duluth and there received on equal terms by railroad-owned vessels even if the canal rate

could compete with the railroad rate? * * * the railroad-owned steamer in Duluth is not going to make it easy for the independent barge owner who has hauled the freight naturally belonging to the railroads. Much flour now goes to the shores of Lake Michigan for shipment east, being hauled over roads in which it is stated the mills are interested. It is believed that it would require a great reduction in freight rates to make the flour mills desert the railroads, and the canal can not bring about this reduction. The flour mills can not be blamed for desiring to favor the railroads, as they would be absolutely dependent upon them five months in the year if the canal were built."

By adding the handling charge of 22 cents to canal rate of 78 cents assumed by the local board in connection with the above statement, the local board conclude the canal can not carry flour.

It is obvious that if the handling charge of 22 to 33 cents per ton is excessive, and it is practical to reduce it to 5 or 6 cents per ton, the conclusion of the local board is without foundation. Of course the canal rate stated by the board of 78 cents is at least 28 cents too high.

But in connection with the excessive character of the handling charge particularly we earnestly invite the attention of the general board to the testimony of Julius H. Barnes, chairman of the traffic committee Duluth Chamber of Commerce, found in volume 2 of the hearings of the House Committee on the Merchant Marine under date January 31, 1913, at pages 839 to 863, inclusive. The testimony of Mr. Barnes is vitally pertinent and valuable because at the hearings of the local board on January 15, 1913, he appeared in opposition to this canal project, and it is in part upon the strength of statements made by Mr. Barnes to the local board that the latter concluded this project not commercially feasible. We should like to quote Mr. Barnes's testimony in full and to reproduce his written statement filed in connection therewith, because in our opinion it presents one of the best arguments we have seen in favor of the construction of this canal. Mr. Barnes testifies particularly with reference to traffic conditions and handling charges on package freight, flour, and general merchandise. With reference to handling charges he says, on page 844:

"They have electrically equipped coal docks that will take coal out of a boat and carry it across and deliver it right onto the waiting railroad car for distribution at a cost of not more than 3 or 4 cents per ton, and it often costs less than that. This method handles freight cheaply at both ends, but not package freight, for which we are paying the same as we did 40 years ago, a transshipping charge of 30 or 40 or 50 or even 60 cents on merchandise per ton at each end.

"Mr. HUMPHREY. How about your terminal facilities? Are those under the control of the railroad?

"Mr. BARNES. Ours are; yes, sir.

"Mr. WILSON. What would you suggest as a means of remedying that?

"Mr. BARNES. This is what I would suggest: I think the Government should build and lease and operate on the Lakes proper modern terminals for package freight. I do not believe the railroads will ever do it. I do not believe individual enterprise can do it as long as the present conditions exist."

In his written statement, with reference to excessive handling charges, on page 861, Mr. Barnes says:

"How can it be corrected? San Francisco is correcting it by installing modern unloading and handling apparatus, which will economically handle general freight from and to a steamer. We understand they have fixed a charge there, which covers their operating expense, at 5 cents per ton.

"New Orleans has done something of the same sort, and we understand their charge is 6 cents per ton for that service. On the Great Lakes the regular scale for taking commodities from the steamer and landing them simply on the dock runs from 21 to 40 cents per ton; and to take it from the dock again and put it in the car, 12 to 30 cents per ton more.

"The new electrically equipped coal docks in Duluth, operated by coal companies for the reduction of their own expenses, take coal from the hold of a steamer, carry it across the dock, and load it into a waiting car at a cost of 3 to 4 cents per ton. The same service on general freights through a railroad freight house would cost 33 to 65 cents per ton, and if it must be stacked in the freight house and piled, because for any reason it can not make a direct transfer, the charge runs easily 5 to 15 cents per ton additional. Put this charge on each end of the Great Lakes in handling general merchandise and see how far away from the Lakes at each end this cumbersome and unnecessary transshipping charge reflects to the aid of competing rail lines.

"Of course, they will keep it as high as they can. Of course, they will make the transshipping of freight from a railroad to vessels just as high as can be excused and maintain it for just as long as possible.

"The elimination of an unnecesarily high shipping charge is not the only economy to be attained by the application of modern methods to Lake transshipping. Here is a comparison: One grain elevator at the head of the Lakes has a record of loading into vessels in one 10-hour day 1,250,000 bushels of grain; one ore dock at the head of the Lakes has a record of having loaded into a steamer 9,456 tons of ore in 25 minutes; one coal dock at the head of the Lakes has a record of having unloaded from a vessel onto its docks in 10 hours and 20 minutes nearly 9,000 tons of coal.

"In package freight, if conditions are very favorable, three days are sufficient to unload 3,500 tons of general freight, but usually more would be required, while for loading the more uniform freight eastbound of mill stuffs 5,000 tons could be loaded in from two to three days. Somebody is paying for all that idle time of the package freight boat."

The substance of Mr. Barnes's testimony that present handling charges on general merchandise package freight, including flour, is from 6½ to 14 times too much. In other words, that it should be 5 to 6 cents and that it runs from 33 to 70 cents per ton.

He testifies and clearly shows that these handling charges are solely occasioned by reason of the fact that since 1890 the railroads have owned practically all the through boat lines from Duluth and Chicago to Buffalo and eastern lake ports. That they have made no improvements over the old-time gangplank methods of loading and unloading freight; that they have failed to install modern terminals and facilities for loading and unloading freight for the express purpose of preventing such freight from going on the Lake and diverting it to all rail routes. He shows that the railroads, through their ownership of lake vessels, have constantly increased lake rates until the difference between lake rates or lake and rail rates and all rail rates is so small as to induce shippers to ship all rail, there being not sufficient saving on the Lake route to warrant such shipments. Thus it is seen that railway control and high handling charges deprive the purchaser and consumer of the benefit of low rates on the Lakes. That the only low freight rates on the Lakes are rates on coal, iron and grain and such rates are low only because independent boats owning their own docks, elevators, and coal and ore loading and unloading facilities, are thus beyond railway control.

Mr. Barnes shows rather conclusively that with the exception of coal, iron ore, and grain the lake transportation upon which the Government has expended more than $100,000,000, is of no particular benefit to the public by way of reduced freight rates. Particularly is this true of communities situated at a distance of 100 to 150 miles from the Lakes, as in the case of Minneapolis. Mr. Barnes shows that with modern terminal facilities on lake ports the freight on flour from Minneapolis to eastern points should be reduced 20 cents per barrel (p. 863).

Mr. Barnes proposes in his testimony and statement that the Government should build and lease or operate on the Lakes modern terminals for package freight. He does not believe individual enterprise can do it under present conditions. He estimates that the amount of general merchandise handled on the Lakes, with proper terminals, would be increased tenfold. (p. 846.)

As to the effect of modern terminals and reasonable charges, we again quote from Mr. Barnes's testimony (p. 862):

"Now, when the railroad interest is, as we have shown, directly opposed to improving those handling facilities, when the record of 40 years shows that they will make no attempt to improve those facilities, when the record of 30 years shows that every saving the Government gives them, with other independent carriers, the benefit of in the way of improving carrying capacity by larger channels and better navigation facilities will not be reflected in lower rates but in higher on all the traffic that they can control and monopolize, then we believe it is time for the General Government itself to take strong and efficient action."

We indorse all of the statements made by Mr. Barnes in his testimony and in the statements referred to. We think the weight of authority and practical experience is in line with the foregoing statements and that the transshipping charges at Duluth on flour and on general merchandise, and in fact on all the commodities which could be transported on the canal, should not average to exceed 6 cents per ton. We agree that if railways are permitted to monopolize

terminals there can be no freedom of water transportation, and to bring about conditions fair to the public there must be access to modern terminal facilities by all boats on like terms. Arguments are not going to produce terminals, but the pressure of economic necessity of reducing cost of transportation is going to produce terminals which will give the service suggested by Mr. Barnes and reduce charges to a reasonable amount per ton—say on an average of 6 or 7 cents. With such terminals the canal will transport flour. We do not ask the United States Government to construct terminals at Duluth or St. Paul. We insist that it is the province of the localities as well as their duty to provide the proper terminals. We have seen that water transportation on the Lakes, as well as elsewhere in the United States and the world, may be rendered practically useless without proper terminals.

RAILWAY MONOPOLY ON GREAT LAKES.

It appears that the railways have a monopoly of transportation upon the Great Lakes, with the exception of coal, iron ore, and grain; that with reference to grain they are rapidly acquiring a monopoly; that the public receives no benefit from the vast amount of general merchandise, flour, manufactured articles, etc., which should be carried upon the Lakes in such a manner as to materially reduce their cost to the consumer. The public which is deprived of this benefit of water transportation has borne its share of the burden of taxation to provide the improvements on the Great Lakes from which they have a right to demand and expect a dividend by way of reduced freight rates.

The construction of this canal, with adequate terminals, will furnish the necessary means of destroying the monopolistic grip of the railways, because it will furnish, in connection with the Great Lakes and the Erie Canal, a through water route from the seaboard to the cities of St. Paul and Minneapolis and the Mississippi River entirely free from railway manipulation or control. The construction of terminals for the canal will force the Duluth and Superior people to build adequate and free terminals at the Lake Superior terminus of the canal, because otherwise the canal and its terminals, St. Paul and Minneapolis, would receive freight so much cheaper than Duluth and Superior as to deprive the latter of commercial territory now available to it.

ADVANCES OF LAKE AND RAIL RATES.

We invite the attention of the general board to the statement of the lake and rail rate history and present situation as contained in a statement thereof made by the commercial bodies of St. Paul and Minneapolis filed with this board on June 30, 1914, and to our original argument.

SUMMARY.

In the original argument and this supplementary statement we have completely answered and overcome all of the objections and obstacles to the commercial feasibility of the canal suggested or contained in the report of the local board, as follows:

To the objection of the local board that the waterways and canals of the United States are decadent and dying out and that the fate of this canal, if constructed would be to lie idle and be abandoned, we have shown that the reason why canals have been abandoned in the past and why our great rivers are not carrying as much commerce as they should is due solely to the fact that railway interests have been permitted to obtain a monopolistic grip upon waterway transportation by various methods similar in character to the methods employed by the great trusts and combinations in throttling competitors and which are now clearly recognized as unlawful and which in the future will not be permitted. These methods are fully set forth in our original argument and need not be rehearsed here. With reference to canals their history shows that most of those which have been abandoned were actually purchased, owned, or controlled by railways for a long period before they became useless for commercial purposes, and that in practically every instance it was through intentional neglect of the railway having control or arbitrary adverse action of such railway that the canal in question became useless and was abandoned. Water traffic on the rivers was destroyed by railways cutting rates at competitive points and recouping any losses thus made at inland non-

competitive points. When this means failed the railways were permitted to build and operate their own boat lines in competition with independent boat lines and by delivering all through traffic to their own boats, forcing the independent boat lines to attempt to live on traffic originating and ending on the water. Then the railway boat lines cut rates on local traffic to such a point as to bankrupt independent boat lines. This practically drove independent water traffic from the rivers and canals and that condition has existed for many years. There being little, if any, traffic on the rivers and canals for a number of years, due to the conditions stated, attempts to revive waterway commerce find many obstacles, due to former railway control and domination, such as an entire absence of waterway terminals with cheap loading and unloading facilities, want of sidetracks, or physical connection of railways with the water front, ownership of water front and sites for terminals by railways. Legislation is necessary to compel proper cooperation between railways and waterways, but the necessity for protective legislation and for the construction of the necessary terminals is now fully realized by the proponents of waterways, and it appears that the necessary legislation, physical connections, and terminals will be supplied so as to make it practicable and economical to engage in the business of waterway transportation upon a large scale.

We have shown by the history of waterways and canals in Europe that European waterways passed through the same experience shown to exist at present with reference to American waterways. The result there was the same as here. For a great many years the waterways and canals of Europe were as decadent as American waterways in their darkest hour. Nevertheless, the Europeans by proper protective legislation, by the construction of proper channels, terminals, improved facilities, motive power, boats, barges, etc., and by compelling proper physical connections and cooperation between railways and waterways have succeeded in building up a great, useful, and economical waterways system. What has been done in Europe is practicable to do in the United States, and we think we have shown in our original argument not only that the decline in waterway traffic is due to artificial conditions and obstacles created and maintained by hostile railway monopoly, but that the time is immediately at hand when waterway transportation in the United States is about to be revived and take its proper place in the economy of our commercial existence. If the recommendations of the Committee on Merchant Marine, referred to in our original argument, are followed in addition to the construction of proper terminals, there is no doubt but what the new era of waterway transportation will begin in earnest.

We have shown in our original argument that the canal rate on the projected canal should not exceed an average of 2 mills per ton-mile, and we think we have shown that the canal rate on coal should not exceed 1½ mills per ton-mile.

We have shown herein that on the exact basis used by the local board to ascertain the available tonnage for 1912 that in that year there was actually transported and available to the canal 4,200,000 tons, and reckoning on the natural increase of the canal territory, as shown by the figures on page 15 in our original argument, in the year 1920 such available tonnage would be increased to at least 9,000,000 tons.

We have shown that the handling charges on coal, as found in the report of the local board, are almost wholly misleading and erroneous (original argument, and herein). We have shown conclusively, we think, that the difference between canal and rail transportation of coal or other commodities involves but one extra handling, and the cost of such extra handling as to coal is from 3 to 5 cents per ton and that such cost is the only extra charge except for 50 per cent of the coal delivered in the Twin Cities there would be an exact charge of 5 cents per ton. We have shown that there is no deterioration in coal involved in the one extra handling by clamshell (original argument). These authorities extend from the United States Bureau of Mines to Thomas P. Roberts, assistant engineer, United States Engineer's office, Pittsburgh, Pa., whose statement is found in the original argument.

We have shown that the handling charges as to flour, general merchandise, and all other commodities, except grain, will not exceed from 5 to 7 cents per ton with the use of modern terminals.

As to grain of all kinds, whereas from the report of the local board it would appear that elevator charges at Duluth and the Twin Cities should in all cases be added to the canal rate to ascertain total cost of canal transportation as

compared with rail transportation, we have shown that all elevator charges on grain at Duluth must be added to the rail rate as well as to the canal rate and that as to practically all grain arriving at the Twin Cities, which is afterwards shipped to Duluth, the same passes through elevators, and as to such grain there would be an elevator charge whether shipped by rail or canal.

We have demonstrated that the tonnage available to the canal will be sufficient to make it commercially feasible even under present conditions, that is, even without the construction of the canal the commerce between Duluth, Superior, and the Twin Cities increasing in the future as in the past, in 1920 would amount to more than 9,000,000 tons. The effect of linking the commerce of the Mississippi with that of the Great Lakes, of opening the new Erie Canal, thus providing a through waterway from the Atlantic seaboard via the Great Lakes and the Mississippi to the Gulf of Mexico, where it connects with world traffic via the Panama Canal, although impossible to approximate, is a factor which should increase such available tonnage to an appreciable extent. This question is discussed at length in our original argument.

CONCLUSION.

From all that appears in the original argument, supplemented by what is herein contained, we think it is clearly demonstrated that this canal project is commercially feasible; that its construction will save the public more than $1,000,000 per annum upon the tonnage available and to be affected by the operation of such canal at the time when in the ordinary course of construction it could be completed—1920.

Not only will the canal be commercially feasible within the rule laid down by the local board of engineers, but we think we have conclusively demonstrated herein that it is a public necessity—if for no other reason—for the effect it would have upon the present traffic monopoly enjoyed by the railroads who own all the through lines of vessels carrying freight upon the Lakes and who have a monopoly of all the carrying trade of the Lakes, except the trade in coal, iron, and grain. The construction of the canal, accompanied as it would be by the construction of modern terminals at Duluth and the Twin Cities, would not only furnish a route free from railway control between the Great Lakes and the Mississippi, over which the commerce of the great Northwest could be handled at freight rates on an average of 50 per cent less than the existing freight rates, but the saving on handling charges upon general merchandise, including flour, upon the immense volume of traffic, which would result, would constitute in itself an immense public benefit and become a monumental example of the necessity of and benefits to be derived from waterways and modern terminals alike.

All of the considerations surrounding the situation from the viewpoint of public economy and public benefit are overwhelmingly persuasive in favor of the solution of the questions presented in favor of the commercial feasibility of this project, and we trust this board will so determine.

Respectfully submitted.

LAKE SUPERIOR AND MISSISSIPPI RIVER
CANAL COMMISSION OF MINNESOTA.
GEORGE H. SULLIVAN,
Stillwater, Minn., Counsel for Minnesota Commission.
By A. O. EBERHARDT, *Governor and ex officio Chairman.*
IRA B. MILLS, *Secretary.*

LAKE SUPERIOR AND MISSISSIPPI RIVER
CANAL COMMISSION OF WISCONSIN.
E. F. ACKLEY,
Chippewa Falls, Wis., Counsel for Wisconsin Commission.
JOHN CHINNOCK, *Chairman.*
E. F. ACKLEY, *Secretary.*

HEARING BEFORE THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS IN REFERENCE TO WATERWAY FROM LAKE SUPERIOR TO THE MISSISSIPPI RIVER, UNDER THE ACT OF JULY 25, 1912.

JUNE 30, 1914 (10 a. m. to 1 p. m.).

Col. Black, Col. Abbot, Col. Newcomer, Col. Winslow, and Maj. Kutz were present.

Hon. Frederick C. Stevens, Hon. Knute Nelson, Hon. A. O. Eberhardt, Hon. George R. Smith, Hon. George H. Sullivan, Hon. Charles R. Davis, Mr. Frank J. Wattrous, Mr. F. N. Stacy, and Mr. James L. Cowles appeared before the board in reference to the above.

Col. BLACK. Gentlemen, this is a hearing on the Lake Superior-Mississippi River Canal. We shall be glad to hear from you gentlemen who are present to address us upon this subject.

STATEMENT OF HON. FREDERICK C. STEVENS.

Mr. STEVENS: Mr. Chairman and gentlemen of the board, I have the honor to commence the proceedings this morning.

This is an old matter, with which some of you gentlemen are familiar. It was initiated nearly 20 years ago, and two adverse reports have been made. It comes before you now on an appeal from the order of the board below refusing to grant a survey of the canal. The reason that we appealed from the lower board and asked your judgment is because we believe that the facts have not been sufficiently reviewed, and because new facts of very great importance have arisen since the previous surveys and since the decision of the board below.

It has been my privilege to have a very intimate acquaintance, as Col. Abbot will know, with the officers of the board below, Col. Potter and Col. Shunk, so that what I would say does not differ very much from their judgment and is based upon facts which were not before them.

The statistics and arguments relative to the possible traffic and to the commercial benefits of the canal will be presented by Gov. Eberhart, of Minnesota, who is here representing the State of Minnesota and the State of Wisconsin.

To show you the importance of this proposition, the legislatures of those two States created State commissions and made appropriations to aid in this investigation and in promoting this plan for a canal. Those commissions have been at work and will submit the result of their labors to you. The governor of Minnesota is here and will present the matter for that State.

All I desire now to state to you in substance is this: When you examine the report of the board below you will note that that board first based some of its conclusions upon the fact of river navigation on the Mississippi having diminished. We realize that river navigation on the Mississippi has diminished, but it is now rapidly increasing. I know that Col. Newcomer will be interested to know that a steamer left Pittsburgh and is now making a round trip to St. Paul and is chartered with freight for a return trip. This week a steamer will leave New Orleans for St. Paul, and is chartered, I think, sufficiently with specific business for the summer.

Last winter, in investigating the Keokuk Dam as a member of the Committee on Interstate and Foreign Commerce, we were told by the steamer lines that the reason they had not carried more freight was because they did not have sufficient facilities, and especially terminal facilities on the river; but now they are preparing terminals and are actually carrying traffic. So that when you read in that report of the board below that that sort of traffic has diminished, it is not exactly accurate, because the railroads can not handle a large part of that business to-day. I think foreign nations are realizing the same thing. I noticed in the Sunday newspapers where the Germans are making large extensions to their inland canals. Those projects are going ahead, and we must pursue the same policy if we are to care for the tremendous traffic of our people in the interior. The railroads have indicated that it is impossible for them to continue making other extensions. That traffic must be cared for, and the only way to care for it is by this system of inland waterways which will look after that business.

There is also objection in that report to the fact that the railroads will not cooperate with barge lines and steamer lines. You gentlemen are familiar with the provisions of the Panama bill, section 11, relative to compelling railways to connect and make through routes and rates and other traffic connections. Other

legislation is now pending. The report of the Merchant Marine Committee has been formulated into legislation that is now pending, and the committees undoubtedly will meet in a comparatively short time, when legislation will be enacted, putting in the Interstate Commerce Commission power and authority to compel the use of terminals.

Because the railroads happen to own the terminals, this country is no longer going to allow them to monopolize them by reason of prior occupation. It is for a public use, and the decision of the Supreme Court a couple of weeks' ago in the pipe-line cases shows that wherever property is needed for a public use, Congress has a right to compel the owners of the property to actually submit it to the public use and dictate the terms of that public use; so that when you read that report, please eliminate that part of the argument, because Congress has, or Congress will, compell the owners of these terminals to grant the public use of them on terms which shall be fair to the owners and for the best interests of the public.

Therefore the question that is really to be presented to you, from a practical standpoint, is, What ought to be done as to a survey for the canal?

Just one thing more. In considering what the cost of the canal will be, please remember this—and Col. Abbott, I think, will be familiar with the actual situation—that the St. Croix River, the boundary between Minnesota and Wisconsin, will form a considerable part of that canal. The river, I think, will be about 125 miles. A considerable part of that river is navigable now. It is navigable for about 50 miles above the St. Croix Dam, which is a large water-power dam from Minneapolis to St. Paul; and considerable power can be developed there by means of slack water. It can be done either by the Government itself or by individuals promoting and building dams under the right sort of legislation, without costing the Government a cent. If our general dam bills are passed—and I am very confident of something being passed to that effect in the very near future—you can safely count on at least 50 miles more.

I have introduced a bill for the construction of a dam, and Representative Lenroot introduced another bill, as to a place just below. I know of another site just above mine.

Those dams, if constructed, will cover a very great proportion of the needed waterways without costing the Government a cent.

So, for those reasons, please eliminate those things from the report of the local engineers.

Col. BLACK. I would like to ask you a question, if I may?

Mr. STEVENS. Certainly.

Col. BLACK. You touched on two or three points that are of very great interest to this board and come into this very thing. We have in the past year been again and again called upon by communities to recommend the improvement of rivers on the ground, purely, that by such improvement the communities will get the benefit of the competitive freight rates allowed by the Interstate Commerce Commission. There has been in no case a statement that there were not sufficient transportation facilities, but that simply by the expenditure by the Government of thousands of dollars, or whatever it may be, the communities then would have the benefit of water competition, and without actually paying anything at all, under this arbitrary ruling of the board, they would then get a lower rate. Has Congress taken that matter up at all?

Mr. STEVENS. Yes, sir. I think Senator Nelson and I have served on the committees which have had to do with those things for a great many years. As you gentlemen are aware, our general policy is this, that the general proposition is the reduction of rates; the equalizing of rates and discrimination as to rates will rest with the Interstate Commerce Commission. That as a general proposition Congress makes these improvements without actual traffic; and I really do not think that improvements should be projected and charged to the Government unless it can be fairly assumed that a reasonable amount of traffic will be carried over the lines. In this case the same proposition that I make here I advocate in other places where I have the responsibility on the other side of the table.

In this case remember that there are three-quarters of a million or a million people at the south end of this canal who are especially dependent on cheap rates for moving their large volumes of heavy, coarse traffic, which will be explained to you. So that it is the expectation and desire and necessity, more than that, as will be explained to you, that the actual traffic will be moved by this canal for which the canal is suitable.

As to the question of rates, of course, that is also a question of facilities. Those things enter into this consideration, and should be considered in connection with this important matter.

Col. BLACK. Senator Burton alluded to this question, but he kind of skipped it in that minority report, and I am very sorry. At the present time the railroads are complaining that their rates are insufficient to pay expenses.

Mr. STEVENS. Yes.

Col. BLACK. Where they charge a rate to a place with water competition, as, for example, Boston, which is calculated to meet a water rate on heavy goods like coal, or coarse freight, then they make a higher rate to the interior. Say that a man living 20 miles from Boston will pay 20 to 40 cents more a ton for coal passing through his town to Boston, and stops at his town, than the man in Boston will pay for coal that passes right through that town to Boston. In other words, that the freight rates do not bear any relation to the cost of the railroad for the services rendered, and are actuated by other things. Is that the average opinion?

Mr. STEVENS. No, sir. There are two statutes which indicate the policy of the Government and which I desire to call your attention to. First, the long-and-short-haul clause, as recently interpreted by the Supreme Court in its decision a week ago, which in a way will prevent that sort of thing unless the railroads can clearly show that it is necessary for them to handle some of this traffic competing with the water traffic at a price not lower than the intermediate traffic. The result will be that gradually, I think, under that decision and under that statute there will be a sort of a distance rate—a sort of a physical distance rate—put it that way—that will gradually work for the railroads; and, of course, if the water lines are under authority of the Interstate Commerce Commission, as they will be, I think, in the not far distant future, somewhat the same policy will be pursued there.

The other statute is another branch of that section 11 which bears upon that question. In passing the interstate-commerce law twenty-odd years ago, Congress tried to point out the importance of the rivers and harbors in the interior of the country, which has to pay the bills. The import and export freight rates with which you are familiar have been debated for many years. Under the decision of the Supreme Court the Interstate Commerce Commission had a right to allow a railway to charge less on an import and export rate than for a corresponding domestic rate for the inland part of the traffic. That has been kept in force ever since. Congress has refused to change it.

And, more than that, in the same section of the Panama act we passed a provision making that principle applicable to domestic water competition. In other words, if traffic lands at Duluth destined to the interior—the Dakotas, Minnesota, and northern Iowa, which is tributary to Duluth—the Interstate Commerce Commission has a right to compel the lower freight rates and the railroad portion of it to be lower than the corresponding domestic rate covering the same point.

The point that I desire to emphasize before your board is this, that Congress, in these two statutes as interpreted, desires to extend the benefit of its river and harbor improvements to as great an area as possible over the country; that it ought to be diffused among the people who pay the bills; that it ought not to be confined to the ports alone that have the benefit of river and harbor improvement; and those two statutes and the decisions of the courts on them tend to a further development of that same proposition and that same idea.

Col. BLACK. I have not had the opportunity yet to read carefully the report or the reply, but I expect to do that a little later after hearing these gentlemen this morning; but in looking over the report I see that the Erie Canal is quoted a great deal, and the action on it. The Erie Canal is a waterway which, passing through the interior, connects large navigable bodies of the navigable waters of the United States. That has been constructed entirely by the State of New York. I wondered whether in your report you had taken that matter up as to the advisability or nonadvisability of this canal, which is very similar, being constructed by State aid.

Mr. STEVENS. State aid might be a different proposition from State construction. Remember that there are two States operating here. I do not know what proportion is in Wisconsin, but a very considerable portion, and a considerable portion in Minnesota. You realize the difficulty of two States getting together and making an agreement for a large financial outlay?

Col. BLACK. New York and New Jersey recently did it in regard to the Palisades Park.

Mr. STEVENS. Oh, yes; that is a possibility. They have to make their agreements and they have to be ratified by Congress. It is possible, and it has been done in the country several times. I am not very competent to speak on that matter, because I do not represent the State; I represent the United States. But I think that if you would speak to the official representatives of Wisconsin and the official representatives of Minnesota they might possibly indicate a line of action which their States might be willing to cooperate in, at least.

Col. BLACK. There is another question I want to ask. I am asking these questions now in order that we may be enlightened on these various points. The question hinges, among other things, on the cost of canal traffic. As far as I know, we in the United States to-day have no data whatever as to the cost of modern canal traffic. The State of New York is building a barge canal and the United States is building a number of canals. There is not to-day, as far as I know, with the single exception of an experiment being tried at Mobile, any experience whatever as to the cost of modern canal traffic under modern conditions. As to the State of New York, I happen to be very familiar with that, and they do not know at all what kind of boats, what size of boats, are going to be the most economical for the transmission of cargoes through the canal. They do not know anything at all about the cost, nor the motive power, nor the rate of progress. In other words, any work that is done to-day, any canal work, is done without a knowledge of what you are preparing for. Under those conditions it is almost impossible to predict what can be done; and it is a question in my mind, and I would be glad to have it discussed by the speakers here, whether under those circumstances it is not the part of wisdom to delay further large canal projects until some experience has been had on the canals that are about to be put in operation, which would enable one to say the cross section of the canal that is desirable, the size of the locks desired, those features being based on the economical type of boat which must be used. The old Erie Canal was a perfectly good canal with 5 to 6 feet of water in it, with perfectly good dimensions, yet it was proved that under modern conditions it can not compete with the railroads. We do not know to-day at all what size waterway is necessary, because it is the same thing with waterways as it is with railroads. A narrow-gauge railroad may be an utter failure, where a broad-gauge road will answer the purpose economically.

So that with canals it is very difficult to say just what size of canal is the economical size. If you get it too small the cost of operating over it will be too great, and if you get it too large you have your cost of operation out of all proportion. We are not prepared to say as to a waterway of that character into the interior what is the size that ought to be used.

I would like to have that question touched upon. It is a very important question, to my mind, whether the United States will go into any more of these large interior canal projects until we know a little bit more about this thing.

Mr. STEVENS. Of course, a survey will take some time——

Col. BLACK. But a survey must be conducted with the idea of a canal of a given size. Do you not see?

Mr. STEVENS. Yes; but you will recall that at the suggestion of the National Waterways Commissions Congress made an appropriation for an experimental type for use on the Mississippi River. That report has just been made and is not yet printed, so I have not had an opportunity to examine it. This canal is designed to correlate with the commerce on the Mississippi River.

Col. BLACK. In draft, but not in cross section. The estimates that are given are to my mind entirely out of the way. They would not cover anything at all. The estimates are not for the right size of canal.

Mr. STEVENS. I am speaking of the canal that is to use the best type of experimental barge that has already been provided for by Congress. They were to have a 6-foot depth on the Mississippi from St. Louis up to St. Paul and a 6-foot type of canal, so that the traffic could move freely up and down the canal and the river. You could get somewhat of an estimate of the cost and of the necessity by the river traffic——

Col. BLACK. No, sir. You are quite correct about the draft; there is not much difficulty about that. But in order that the traffic may be carried cheaply, a certain size of boat must be used, the smaller size being uneconomical in not carrying sufficient cargo to make it pay, and the larger size being too large and uneconomical in the cost of carriage. In connection with draft, the question of beam and length comes in. Beam comes in particularly on the width. Your locks must be of such size that you can take in one, two, three, or four boats of a given size. So that beam comes in and length comes in.

Until you can determine approximately the economical size of carrier, you can not get the economical size of canal.

Mr. STEVENS. Will not two factors aid in determining it? First, the navigation that will use the canal will be distributed up and down the Mississippi by these experimental barges, and if it is of any value to the people in that valley at all, that will determine the character of traffic that can use those waterways to best advantage.

Col. BLACK. When it has been so determined. It has not been determined yet.

Mr. STEVENS. No; but it is in a fair way to be determined.

Col. BLACK. It is so far from it that in New York State there is not a canal boat being built to-day. They are waiting. They have a barge canal there, and they know the size boats that will go through it, and yet they are waiting, trying to find out what is the economical size.

Mr. STEVENS. Of course, my own hasty opinion is that the 6-foot channel is determined on the Mississippi.

Col. BLACK. That is all right. That is draft.

Mr. STEVENS. That factor has been determined with regard to this canal.

Col. BLACK. Yes, sir; that is right.

Mr. STEVENS. Then, with the figures fairly well in hand as to the cost of handling that sort of traffic in canals in Germany——

Col. BLACK. They have another type of boat, entirely, under different competitive conditions. They do not have competition with the railroads there.

Mr. STEVENS. I was going to come to that railroad proposition in just a moment. I noticed a statement in the last Sunday papers that the Germans are extending a 6-foot type of canal with 550 or 600 ton barges from Berlin to Leipzig, right through the interior. Does not that determine?

Col. BLACK. Not our conditions. We can not go absolutely by European practice in any of our work. Our conditions are different, and we have always had to work out our own solution of these various problems, being guided as far as we can by the experience there; but in every case that I know of we have had to change the type when we got into our territory to meet our conditions. We do not know to-day what the conditions are. We do not know how it is to be built. We will know in about four years from now a great deal more than we do to-day.

Mr. STEVENS. As to the railroad phase of it, that is the same matter that was alluded to when the railroads were asking for increased rates. We will develop two things: First, that there will be a certain class of freights, probably, which will have a slight increase. What those will be has not been determined yet by the commission. Services that the railroads have performed free, like switching and stock lines, and matters of that kind, will now be charged for, and that is a service that the railroads have used and have eliminated the waterways to a very large extent. That is the old question of service being performed free in the large industrial centers. That has enabled the railroads to do away with a considerable part of the waterway competition. That business will be built up by orders of the commission and the railroads themselves. That service hereafter will be charged for, and to that extent the waterways and the waterway traffic will have quite a decided advantage.

Col. BLACK. There is no doubt that this question of transportation is the most vital one we have before us now. We can not reach the desired result in lowering the cost of living until things can be produced at the points where they can be produced more cheaply and transported to the points where they are needed the most; and that will require rail and water transportation to the utmost limit. They have got to be correlated and they have got to stand on the measure of the cost of the service rendered. The cost of each must be in proportion to the service rendered.

Mr. STEVENS. And must be compelled to work together.

Col. BLACK. Oh, yes; they must be.

Mr. STEVENS. Now, I take pleasure in introducing Senator Nelson, who will now speak to you.

STATEMENT OF HON. KNUTE NELSON.

Senator NELSON. Mr. Chairman and gentlemen of the board, I have not come down here to discuss this matter with you directly, because there are other gentlemen here who will present the case to you more fully.

Gov. Eberhart is here, and State Senator Sullivan from Stillwater, who lives on the line of this proposed canal.

Before I state anything further I should like to leave here and file with the board a resolution in respect to this matter from the Minneapolis Chamber of Commerce.

I want to say that my understanding of the case is that this proposition involves no engineering difficulties, nothing of a serious character so far as that is concerned. By building a canal from Lake Superior to the waters of the St. Croix River a large share of the St. Croix River can be canalized and used by means of a system of dams, as stated by Mr. Stevens.

I call your attention to the fact, as you, Mr. Chairman, have well stated it, that it is practically a commercial proposition and not an engineering proposition. The question is whether this canal would be for the commercial advantage and benefit of the people who naturally would receive the results of the transportation contemplated.

If you will look at the map of Minnesota you will see that right at the end of this canal, as it were, or of this waterway, there are the two great cities of St. Paul and Minneapolis with a population of over 600,000—between six and seven hundred thousand; with their suburbs perhaps more. Barges could be taken from Lake Superior right up to the wharves of St. Paul and Minneapolis. The great dam between Minneapolis and St. Paul is fast nearing its completion, if not already completed. The result of it is that barges can be taken directly from Lake Superior to the docks at St. Paul and Minneapolis; so that the question of joint rates between the waterway and the railroad route does not cut the figure there directly with those two cities. It is only when you come to ship the freight into the interior that that question arises.

In the recent decision of the Supreme Court—I do not remember the title of the case, but the decision was announced last Monday—the Supreme Court was concerned with what we commonly call the Spokane case. You know, there was a peculiar situation under the old interstate commerce law as it existed up to recent amendments. It provided that railroad companies should not charge more for a shorter haul than for a long haul in the same direction under similar circumstances and conditions. I am not quoting the language exactly. We eliminated the phrase "under similar circumstances and conditions" in the amendment to the interstate commerce act that was passed in 1910. Prior to that elimination the conditions were these; and I will recite this specific case:

The city of Spokane—you all know where it is situated—had to pay this rate of freight. They charged freight, say, from St. Paul to Seattle, and then the freight from Seattle back to Spokane. In other words, it was based on the theory that the freight shipped from St. Paul to Spokane should be shipped to Seattle and then back to Spokane, and they charged the shipper that compound rate and the local rate back to Spokane.

You can all see what a terrible burden that was, and it was all done on the theory that Seattle, having water competition, was entitled to those low rates, and the railroads had to give extraordinary low rates, really below the cost of service, in order to compete with the water routes.

Under the decision in the recent case, to which I refer, and under the amendment that we made in 1910, the Supreme Court has lately held that they had a right to reduce rates, such as those Spokane rates, and they did reduce them and sustained that provision of the act of 1910 which eliminated the words I have referred to.

In that way Congress, by that legislation, gave immense relief to people residing in the interior points.

There is another point I want to call attention to, and that is this: You will find that wherever water transportation and railroad transportation meet it is the water transportation that controls, as a rule. In other words, you will find—and I think it will be more apparent when the Panama Canal is opened and traffic commences there—that the rates at the Pacific ports, San Francisco, Seattle, and other ports, the railroad rates, will have to conform to the water rates. That is on through traffic.

Col. BLACK. Senator, then will they be allowed to make it up from the people in the interior?

Senator NELSON. They may, to some extent; but still it does not follow because they must conform to those rates that the rates will be unremunerative. That does not follow. The one proposition does not follow from the other.

Take this case here that you have in hand regarding the question that you suggested a moment ago as to the cost of operating these barges. It is a matter of common knowledge that water transportation, wherever it has come in direct competition with rail transportation, has always had the effect of lowering rail transportation. Take the whole course of the Mississippi River. Since we have been improving that river, although the commerce on it has diminished year by year, yet the rates to points on the Mississippi River have been immensely lower. That is one of the great advantages that you never ought to overlook in the matter of water transportation.

What is the character of the chief traffic that comes by the Lakes? It is what we call heavy goods—coal, salt, and other similar commodities. The coal is shipped up to Duluth at a very low rate, for the reason that the ore boats that carry iron ore down the Lakes are glad to get traffic back; but when that coal comes to Duluth and is distributed from that point to the interior, then the railroads get their work in and levy a heavy tribute. I think they charge about a dollar a ton; 96 cents on soft coal and $1.20 on hard coal.

With this barge canal from Lake Superior down the St. Croix River and up to the docks and wharves at St. Paul and Minneapolis, you can readily see that under any conditions water transportation will be cheaper than that.

Col. BLACK. No, sir; I can not quite see it. I would like to have you make it a little more clear.

Senator NELSON. I state it on this theory. Of course, I can not go into any statistics with you.

Col. BLACK. No, sir; I do not want any.

Senator NELSON. I think, Mr. Chairman, that in this direction our experience in the past has always shown us that water transportation has tended to reduce rates.

Col. BLACK. Yes, sir. Your opinion, Senator, has a very great weight with us. I have read a great many of your reports and arguments with a very great deal of interest, and I want to get the information now right from you. Here we have a case of this kind. Both rail and water transportation are media of transportation for the public, which ought to be availed of where it is cheapest.

Senator NELSON. Yes.

Col. BLACK. It costs money. In one case the railroads have to put up the money for their own road and own it and have the measure of control over it and the measure of control over rates. In another case the people of the entire country put up the money. If it costs more when we consider the cost of the water route, the interest on the money and the cost of maintenance to transport by water from the other places, is it a proper investment? If, in other words, it would be cheaper for the people of the country, irrespective of where the money comes from, to have the rail transportation, should the Government then pay for an expensive water route in order to reduce that cost?

Senator NELSON. Yes, it should for two reasons. In the first place, the people are entitled, the public are entitled to the lowest possible rate——

Col. BLACK. Would they be getting it?

Senator NELSON. I think so. In the next place, waterways, I conceive, are a much greater regulator of railroad rates than the Interstate Commerce Commission is. We have got more benefit in our State from the water rates of the Great Lakes than we have from the Interstate Commerce Commission.

And I want to say further that the great benefit that the people of Minnesota have received recently under the decision of the Minnesota railway cases, reducing our mileage for passengers, short or long distances, for everybody, and commodity rates—we have received that benefit not through the Interstate Commerce Commission but through our State legislation and our State railway commission; and that legislation was attacked, but the Supreme Court of the United States sustained it in a leading case announced by Mr. Justice Hughes.

Here is another thing I want to call your attention to, and that is that the Interstate Commerce Commission always justifies the railroads in having low rates at water terminals because of the water competition. We get a lower rate directly by water transportation, and indirectly it affects railroad rates.

Col. BLACK. Do you think that will stand for all time?

Senator NELSON. Why, I think so.

You spoke, Mr. Chairman, about the Erie Canal. Let me call your attention to this: Let us go back to the early history. What made New York the commercial metropolis of this country?

Col. BLACK. Its location on the Hudson and on the Atlantic seaboard——

Senator NELSON. No. The Erie Canal gave it a start. There was a bigger harbor and a better place down at Fortress Monroe and Old Point Comfort. Had the waterway been built down there to the navigation of the James River there would have been a point for the commerce of this country. It was the Erie Canal, the building of the Erie Canal, that gave New York its commercial start and made it the commercial metropolis of this country. It is because New York is fearing that it may lose that vantage ground that it is expending millions to enlarge that canal.

You, Mr. Chairman, know more about the details of that than I do. In view of the fact that the statistics show that the canal does not carry more than a small picayunish bit of the total freight, why are they expending millions? It is to hold that canal as a competitor of the railroads and enable New York to maintain its commercial supremacy.

Col. BLACK. That is one of the factors.

Senator NELSON. Can you account for that expenditure on any other theory? Can you account for it, Mr. Chairman, or any of you gentlemen, on any other theory than that New York seeks by means of that canal, first, to regulate the through rate from the Lakes over to the harbor of New York, and in the next place to maintain its commercial supremacy? That is at the bottom of it.

Col. BLACK. That is not the only factor. There is another thing that comes in there very strongly, and that is the competition of the Canadian canal and the St. Lawrence water route. That, New York is very much afraid of.

Senator NELSON. That competition is not so great at present because of the limited scope of those canals. Ocean vessels of any consequence now can come up no farther, I believe, than Montreal. Smaller vessels may possibly go through the Welland Canal, but at present there is no competition of that kind.

When we speak about the benefit of waterway navigation as an entirety, look at the advantages that the Northwest has received from the improvement of the Soo Canal. And think what great commercial advantages we will reap as an entirety from the Panama Canal. It will no doubt increase the commerce of this country immensely; but more than all, Mr. Chairman, the tendency of it will be to reduce transportation rates.

You spoke about the capital for the building of railroads being raised and furnished by the railroads; that they are built with their own money. In a measure that is true in the first instance. They raise the money, but it is the public at large that has to pay the interest and pay the dividends.

Col. BLACK. There is no question about that.

Senator NELSON. And pay for the maintenance and upkeep of the roads. It comes out of the public.

Col. BLACK. There is no question about that.

Senator NELSON. Why should these States be compelled to build this canal? Why, only two years ago Congress passed a bill for a canal from Norfolk back to one of the sounds in North Carolina, alongside of the Dismal Swamp Canal. You are no doubt familiar with that?

Col. BLACK. I was on that board.

Col. ABBOT. So was I.

Senator NELSON. You recall in that case, if I remember it aright, there were two canals, and also another route that was suggested, if I recall it rightly——

Col. BLACK. You are quite right.

Senator NELSON. We finally adopted the route that you recommended, I think, and we built that canal in favor of that route. I supported that measure. I thought it was right; and that canal, in respect to the amount of commerce and traffic and the commercial advantages as compared with the canal we are speaking for here to-day, is only a fleabite.

Col. BLACK. That we want to know.

Senator NELSON. It is only a fleabite. You look at the country. Study the country contiguous to the Dismal Swamp Canal. I will call it that. That is not the proper name of the canal, but I can not recall the correct name at this time.

Col. WINSLOW. It is the Albemarle & Chesapeake.

Senator NELSON. Examine the country contiguous to that canal, at its two termini, and you can readily see, if you consider it, that the cities of Duluth, St. Paul, Minneapolis, Stillwater, and the prosperous agricultural country surrounding that—you can see the vast difference there is between the traffic that would naturally inure to one canal and that which will necessarily inure to the other.

Col. BLACK. I think if you will look at that further you will find that you are mistaken about that.

Senator NELSON. Well, of course we will not ship as many vegetables nor as many cantaloupes nor as many watermelons nor as many sweet potatoes as they will, but we will ship a lot of flour and a lot of coal and a lot of salt and a lot of other traffic——

Col. BLACK. Senator, excuse me right there. That will depend entirely on the cost of operation. If the cost of shipping by water is going to be markedly less than the cost by rail, you will do it, probably. If not, you will not. That is not the question that is up. How much traffic will seek it? That there is traffic there is no question at all. There is an enormous amount of freight that has to be moved from that section to another section. It is a question, though, how that freight shall be moved; and that is an economical question that comes in. If it is going to be cheaper by that route, the shipper is going to do it. He has no sentimental reasons about it at all.

Senator NELSON. Have any of you members of this board known of any well-defined case where transportation by water has cost just as much or more than railroad transportation?

Col. BLACK. Yes, sir. The Illinois & Mississippi Canal has cost the Government a great deal more.

Senator NELSON. You mean the building of the canal?

Col. BLACK. No, sir. Taking the cost now, the cost per ton-mile of freight carried over it; taking into consideration the cost of——

Senator NELSON. There is no traffic at all on that canal, and the canal ought never to have been built.

Col. BLACK. But they came before us with the same argument that we are hearing now.

Senator NELSON. No, no. The conditions were entirely different from the conditions existing here. Here it is a question of joining with the navigation of the Great Lakes the head of navigation of the Mississippi River—two great commercial water arteries of the country. It is a different proposition from that. That was a simple matter, simply connecting the Illinois River with the Mississippi River, if I recall it rightly. Am I correct as to that?

Col. NEWCOMER. That connects with the Lakes also.

Senator NELSON. Yes; but there was no connection with the Illinois River and Lake Michigan.

Col. NEWCOMER. Oh, yes; there was.

Senator NELSON. There is a drainage canal leading into Chicago. I do not know of any other canal there. The only canal that I know of connecting directly the Illinois River with the Mississippi River is what we call the drainage canal.

Col. NEWCOMER. There is a canal built by the State out of proceeds of land sold. That canal is still in existence, but of course it is a very poor one.

Senator NELSON. And there was no connection, really, between that and Lake Michigan of any consequence. It is not a fair comparison.

Col. BLACK. You asked me for one example, and I simply gave that. I did not say it was the same.

Senator NELSON. I take it for granted, and I think you will agree with me in assuming that water transportation as a rule is cheaper than rail transportation. There is no doubt about that.

Col. BLACK. There is no question whatever.

Senator NELSON. What the cost of moving freight on canals will be of course is a question to be determined. In the Erie Canal the original transportation was by horses. I had the fortune, in 1849, as a 6-year-old boy, to ride the whole length of that canal, and I remember that our boat was pulled by two horses. I suppose that in the new plan of canal they will have some other motive power.

Col. BLACK. They expect to have the motive power in the boat. There have been boats with their own motive power navigating the whole canal; but the boats were so small that they could not economically compete with the railroads. Its size is quite comparable to the size proposed in this canal, as I recall it. It did not pay.

Senator NELSON. You know the technical term of what I would call the size?

Col. BLACK. Yes; that is a question of cross section.

Senator NELSON. That would come from having motive power on the boat as compared with those being pulled by horse power or mule power.

Col. BLACK. That is a question of speed and size, both together. Those things come in there.

Senator NELSON. Of course, the future will bring forth what type of boat will be the most profitable to use and what motive power will be the most profitable to be used. The two questions, both as to the size of the boat and as to the motive power, as you have indicated, Mr. Chairman, are to some extent still in the air. It is a question to be determined in the future. But for that reason, Mr. Chairman, we ought not to delay in this waterway improvement. The solution of the question of the best type of boat and the best type of motive power is a solution that will inure to the benefit of this canal, like all other canals of the country. You would not want us to discontinue the Dismal Swamp Canal. You would not want us to suspend operations on that until you determine this question.

Col. BLACK. No, sir. Another question comes in there. There is a type of boat that is in use now all along on these inland waterways, and the type of boat in use on the Chesapeake & Albermarle Canal may not be the type of boat, probably, that would be used on these Illinois inland waterways, because they have got to navigate a great deal of open water.

It is another question entirely. It is directly comparable to the New York barge canal. What is the estimated cost of this canal with the dimensions given?

Col. NEWCOMER. About eight million.

Col. BLACK. I know that is too small. I do not believe that the estimate is wrong, but the canal is too small in cross section. In other words, it is a question of investment of, say, ten and a half millions of dollars. Just how much it is we can not tell, because it would depend entirely on the dimensions to be given and on the dimensions of the lock. We do not know that to-day. That we will know certainly, because it will be directly comparable to the kind of work done on the New York barge canals; the type of boat that is found best there will undoubtedly have a very strong influence in determining the type of boat to be used on the other. You are asking the United States to go into a great big investment without passing on the value of the investment, and it is a question whether, as a business man, inasmuch as we will certainly have this information in three or four years, it might not be better to defer the entire question until we get this information and are better prepared to answer these questions as to what is the economical size of the canal that is desirable. You see, it would make a difference of several millions of dollars.

Senator NELSON. You can not judge it by or compare it with these other canals. This canal down here near the Dismal Swamp Canal, as you have expressed it, a part of the water route is through open water.

Col. BLACK. The greater part of it.

Senator NELSON. Yes; a great deal of it is through sounds, and where we would manifestly require a different type of boat from what we would in this canal. Those conditions would not exist here in this canal. It would be a canal that would be partly a canalized river.

Col. BLACK. And part of it open-river navigation and all in quiet waters.

Senator NELSON. All in quiet waters; and you could assume this, that you could use the motive power there that you could use on any canal of that kind in the country now. Aside from that, the question, then, reduces itself to the cost of operation. Is there any of you who have any doubt but what the cost of operation of a canal, a suitable canal with suitable boats, is less than the operation of a railroad?

Col. BLACK. No, sir; none at all; but to that question of operation must be added the interest charges on the investment.

Senator NELSON. Yes.

Col. BLACK. And that is what we do not know.

Senator NELSON. No; but that is a question that we will have in all these canals.

Col. BLACK. Yes; in all of them.

Senator NELSON. I take it that New York will never get a return on its investment.

Col. BLACK. As a matter of fact, New York is dissatisfied now with the canal. It is convinced that it should have made a canal 2 feet deeper. That would have added one-third more. They spent $100,000,000 without knowing what they wanted, and they finally got a canal that was not as economical as an expenditure of a little greater amount would have been. We do not want to make those mistakes.

Senator NELSON. No; I see. Mr. Chairman, I would like to say something more, and then I am through. I am a member of this "trust busting" committee, and I shall have to return to a meeting of that committee. Gov. Eberhart and Senator Sullivan and others are here and are familiar with the commercial side of the proposition and they will talk to you, and I invoke on their behalf your careful consideration and attention to everything they say.

Col. BLACK. We are sorry that we can not cross-question you more, Senator. We like very much to get you up here.

Senator NELSON. I have been on the Committee on Commerce and have had to do with every river and harbor bill that we have had for the last 18 years, and I have always been in favor of liberal water transportation, and, largely because of the fact that from our own experiences in the Northwest, we have found water transportation to be one of the great regulators of railway transportation. It is not so much because we have carried more freight by water, but it is because we have got cheaper railroad rates that I favor it.

I thank you very much for listening to me.

Col. BLACK. We are very glad to have had you here.

STATEMENT OF HON. A. O. EBERHART, GOVERNOR OF THE STATE OF MINNESOTA.

Gov. EBERHART. Mr. Chairman and gentlemen of the board, I shall necessarily be brief, because I have to make a train out of the city within a short time, and I am speaking here merely on behalf of this State to show you the interest the State has in the development of this country and in the improvement of our entire Northwest in having water transportation.

I think you all concede, and the chairman has already conceded, that in the development of the Northwest we have to have the cooperation of all transportation facilities. Minnesota to-day is one of the two States vitally interested, and she has now a population of 25 to the square mile. In southern Minnesota and in some places in northern Minnesota she has only 10 to the square mile. We are getting population faster than any other State in the Union.

When we bear in mind that that has come within a few years, it is a serious question, in view of the fact that it is only a question of the construction of the barge, to say to the people of the Northwest that they must wait for this canal building for three or four years more. I think it is conceded to-day that that thing is going to come—connecting up with the Great Lakes route and the river system, and the matter of going to the Pacific coast is only a question of a short time to come; and it is a serious matter to say to the people of Minnesota and Wisconsin, "We can construct this canal, but we can not determine to-day what kind of a barge you want."

It seems to me that all of the engineering ability is here already within your control. We have accomplished the greatest engineering problems in the world, and we have the money behind us to do it. It is difficult for the States, because it is hard to get together. It means a great deal of delay.

I can speak for Minnesota and say to you that Minnesota will cooperate. I can not pledge the State of Minnesota as to any definite financial assistance, but the very fact that of all the projects proposed to our legislature the only one recognized was this one, and it was recognized almost unanimously by the entire legislature, shows that she is willing to cooperate.

I think that is true of Wisconsin, in making an appropriation to go before you and present the facts to you.

I think we are all clear on this one thing—that the report on which the engineers' conclusions were based was made to some extent upon a misrepresentation as to the amount of freight. If you take the figures as they have used them and get the actual freight—as Senator Sullivan will give it to you, because he has time to do it—you can conclude that there will be an actual return on this investment of about 3½ or 4 per cent. But even supposing that you can not figure out the 3 per cent dividend on the investment, you can see that the waterway improvement will benefit the entire Northwest and will necessarily in the future return a dividend, and you can see that we can not hold it up for three or four years, because we can not figure out the actual return to-day. I think it is a mistake to do that. I think a lot of the improvements that you gentlemen have approved, as shown by your reports in connection with rivers and harbors improvement, have been well and judiciously made; but yet if we figure them all out, how many of them can you actually

say have brought 3½ per cent return? I think the mistake we made was that we did not think the new canal would have the modern loading and unloading facilities, and instead of figuring 25 or 30 cents a ton, it ought to figure 5 or 10 cents a ton.

We are getting active along the entire river—Minnesota and Wisconsin and all the river States are getting active in establishing loading and unloading facilities and municipally owned docks and wharves all along that river. Minneapolis has already started, and so has St. Paul and all the towns south of us. We are going to have a uniform system. In fact, I myself and the governors of Illinois and Missouri have been authorized as a committee to secure engineers and get a report that can be adopted by all the river towns in establishing docks and wharves.

We have not been benefited by the river because in the past we have not had loading and unloading facilities. Minnesota is immensely interested in the project, because when we get 100 population to the square mile it is quite an important matter to us.

As to the heavy bulk and slow freight, you turn to the water routes instead of to the railroads. The railroads are going to get the high-class and the fast freight. That will always go with the railroad. But the heavy and bulk freight, which constitutes a large proportion of our freight in a great industrial territory like Minnesota, will go by water. It appears to me that the time is soon coming when we must have a complete water route between the Great Lakes and the Gulf of Mexico, and I feel that we are not justified in holding that up for three or four years. The development of the entire Northwest is dependent upon cheap transportation by water, and the country is growing very rapidly.

We feel that you can go ahead and approve this canal. Supposing it will cost $10,000,000. It is now estimated at less than $8,000,000; but supposing it is $10,000,000, or $12,000,000. You have determined already that the canal is entirely practicable from an engineering standpoint. Senator Sullivan has the figures to show you that a great deal more freight is handled than was estimated earlier. Errors can be made by everybody, and we think we have made errors which ought to be corrected. I believe that when these are presented to you, showing the enormous amount of traffic, you will not allow the question of construction and the type of boat required to hold the proposition up three or four years.

Speaking for the State of Minnesota, I want to say that Minnesota will cooperate with the Federal Government in this question in every possible way; but it is a national question. The tremendous amount of freight handled will involve national rates entirely; but it is being constructed largely between Wisconsin and Minnesota. We have had many difficulties. If the Federal Government is justified, as I think it is, in expending money on a waterway improvement that means so much to the Northwest as this does, I think it ought to be done now and not keep us waiting three or four years more.

You can study the geography of this country and the movement of population, etc., and you will find that the center of population is going westward; it is nearly at Minnesota. In the past Minnesota used to send her goods eastward and have them sent back as finished products. That time has gone by. We must keep on with our development. There will be a complete system of waterways, but the first thing that we necessarily must have is this canal. And, speaking for Minnesota and Wisconsin, and realizing that if there are any engineering difficulties you can straighten them out, and realizing that it is a problem for the National Government rather than for the States, we are asking you on behalf of these States to proceed, and we take it for granted that when we determine what kind of a barge is needed, that the amount of traffic that will pass through the canal in four or five years will sustain that 3½ per cent dividend on the investment. While you have spent a lot of money on our river and have done a good work, we do not want you to say to us now that merely because you can not determine definitely what kind of a barge is required that it shall stop this progress and this advancement of the canal project.

Col. BLACK. How soon would it be possible for the States of Wisconsin and Minnesota to state the amount of cooperation they will be willing to make?

Gov. EBERHART. It might take a long time, or we might do it at the next session.

Col. BLACK. That would have a very important bearing on this question.

Gov. EBERHART. We are doing this now; we have already started on an investigation looking to a uniform plan, and when we get that it will not take

long for the river to be improved. But it is no use to speak of that until we have some plan.

Col. BLACK. That is quite right.

Gov. EBERHART. We are working hard on that. Minneapolis is covering quite a lot of ground, and quite a large number of those cities to the south have done the same thing. So I think they have done as much as they can. If it is determined that the State must do this work, you can readily see how difficult it is for the States to get together. You have the engineering ability and you have the best there is. If the Federal Government undertakes the work, it is going to be done. We think that there are so many national problems involved that it is for the Federal Government to do it. Whatever capital you think the States ought to give—I do not think necessarily it should be along financial lines, but in the way of making that canal acceptable for transportation purposes—the States are willing to do it.

I shall not take up any more of your time. I really feel deeply obliged to this board for giving us a hearing, and I am sure that any action that you desire to be taken on the part of the State, as far as cooperation is concerned, will be gladly taken; but you must bear this in mind, that if you delay it and expect the States to take action in constructing this canal it is going to delay it. The legislature meets every two years, and the first thing to do is to make an appropriation for a survey and go over for two years, and then we might have difficulties and have to go over another two years.

Mr. Sullivan will be prepared to show that the facts and figures used in the last report were erroneous. We are not blaming anyone for making those errors in there, but they are there, and we believe that the conclusions were based on errors, and we feel that we are not justified in letting that go through without giving the States of Wisconsin and Minnesota and all the Northwest a chance to develop as we ought to by having this canal constructed.

STATEMENT OF HON. GEORGE R. SMITH, FIFTH CONGRESSIONAL DISTRICT OF MINNESOTA.

Mr. SMITH. I am a Congressman from the fifth congressional district of Minnesota, embracing the city of Minneapolis and the county of Hennepin, 161 square miles, containing 400,000 people.

Col. WINSLOW. How much of that is the city of Minneapolis?

Mr. SMITH. Fifty-three square miles.

I have listened with considerable interest to what has been said with reference to this project, and being a new Member of Congress I have not given it the thought and consideration that the other Members, like Senator Nelson and Congressman Stevens, have given it. It is one that requires a great deal of thought and consideration, and I say that I have not had the time and I am not going to impose upon the good nature of the board with any lengthy statement on this subject.

I have prepared a few remarks that I am going to file with you, and while I am on my feet I wish to express the desire of the city of Minneapolis to have this canal built. We are very anxious to have it constructed. While I realize that the city of St. Paul—the "twin"—and Stillwater and Duluth and Superior and Winona will all be greatly benefited by it, and probably to the same extent proportionately as Minneapolis, we feel at Minneapolis that we are specially interested because of being a manufacturing center.

Fifty years ago I was born in that city, and I remember distinctly that freight was being carried from St. Paul across the prairies to Warburton, Fort Gary, and Winnipeg by oxcarts, afterwards by cattle trains, and then by railroad. To-day we have the great systems of railroad in our State. It was remarked a short time ago that in the building of railroads the owners furnished the capital. In our State the first four railroads which were built had $27,000 furnished by the citizens of the State itself for every mile of road that was built, and it only cost the builders $23,000 a mile to build it.

Being reared in that State, as I was, I have seen its possibilities, and from the oxcarts to the great railroad systems that we have now has been a long step. However, we have filled in with a population of about 2,250,000, according to the last census; possibly it is now in the neighborhood of 2,500,000, which is a population in which every man is a worker, and as a result of that the city of Minneapolis, from a small hamlet that I can remember, is to-day a city of 335,000.

From the water power that has made the mills of Minneapolis the greatest in the world—30,000 horsepower, as I remember—we have now some four or five other water-power dams that produce three times as much water power as the old St. Anthony Falls did, and practically all that power is consumed in the Twin Cities. We use in the Twin Cities practically all of the power that is generated by the St. Croix Dam, which is about 28,000 horsepower.

Our rapid transit company has a dam of its own. We use all the power from the Coon Creek Dam in our industries. Our mills grind in the neighborhood of 80,000,000 bushels of wheat a year. We ship out of Minneapolis in the neighborhood of 18,000,000 barrels of flour a year.

Besides having the greatest flour-milling industry in the world, we have the greatest flax and linseed-oil industries in the world. We are sending abroad great quantities of oil cake, and we are grinding the great bulk of the linseed oil used and manufactured in the United States. It is safe to say that in addition to the 100,000,000 bushels of wheat that comes into the market of Minneapolis we have at least 60,000,000 of coarser grains, and it is safe to say that 80 per cent of the wheat and the coarser grains are manufactured in Minneapolis.

We are using to-day in the neighborhood of 200,000,000 tons of coal in the city of Minneapolis alone. That coal is being brought to us by lake-rail rate, 30 cents from Buffalo to Duluth and 90 cents to $1.25 a ton from Duluth to Minneapolis. That alone will furnish a great quantity of commerce to the proposed canal.

There is no doubt that as our State grows in population and in industries the railroads will handle the first-class freight and that the canal will handle the second or third class freight, or the freight that will move slower.

We are now building at Duluth one of the greatest steel mills in the world. As a single plant we have the largest. We use a great quantity of steel in Minneapolis. We have the greatest threshing-machine manufacturing industry in the world. We have the greatest traction-engine manufacturing plant in the world. We have the greatest assemblers and reshippers of farming implements in the country.

The business men of Minneapolis pledged the Mississippi River Improvement Association 100,000,000 tons of freight for the Mississippi River project last year; and at the rate at which we are increasing and the rate with which our whole State is growing there is no doubt that by the time this canal will be completed, if you start now in making your survey, Minneapolis alone will furnish to the canal from 1,000,000 to 3,000,000 tons of freight per annum.

That is one of the important things that you gentlemen are considering. You want to know whether this canal is economically feasible and you want to know what it will cost, and after that is ascertained you want to know how much freight it will carry and what will be the cost of carrying that freight.

When you take into consideration the history of our State, its rapid development, its necessity for cheap transportation, so that the citizens of that community can be put in close touch with the coal that is needed in its industries, the great necessity for this water transportation will be realized. That is one of the great drawbacks; and until we have cheaper coal our manufacturing industries will be retarded. Why, if we had the canal constructed and it could carry freight from Duluth to Minneapolis at from 50 to 60 cents a ton, that would bring the coal mines on Lake Erie within 100 miles of the city of Minneapolis. We are willing to discount that slightly, but there is a great deal of truth in that assertion; and the citizens of the State of Minnesota and of the Northwest feel that they are furnishing a large share of the revenues to run this Government. They feel that the citizenship that they have, the fertile soil that they have, the climate that they have—that with those things they are going to furnish a great deal more in proportion, in the future, than they have in the past. Nothing can stop it except just such a neglect as it would be to refuse to carry out this project.

I can remember when the city of Minneapolis did not furnish $5,000 in postal receipts to the Government of the United States. It furnished last year $2,250,000 in postal receipts. While it is an inland city and has no water transportation, it furnished to the Government over $900,000 in customs receipts.

To-day its citizens are expending $300,000 in building wharves and docks, municipally owned. It is just putting in the retaining wall and buying land.

We expect to expend a million and a half upon our docks and upon our modern means of loading and unloading commerce. We are willing to do that; and,

if I understand the public questions aright, every dollar that we so invest enriches this whole territory and this whole country, and that we are paying and will pay a large share of the revenues which are turned into the United States Treasury.

When these things are taken into consideration, together with the technical knowledge possessed by this honorable board, we feel that this board could with propriety make some arrangement by which the Mississippi-Lake Superior waterway could be undertaken, at least in a preliminary way.

I desire to thank the board for this opportunity of coming before you and for listening to the remarks that I have outlined.

STATEMENT OF MR. FRANK J. WATTROUS, REPRESENTING THE ASSOCIATION OF COMMERCE OF ST. PAUL AND THE COMMERCE ASSOCIATION OF MINNEAPOLIS.

Mr. WATTROUS. Mr. Chairman and gentlemen of the board, I want to take just a moment of your time. I did not know until the last moment that I was to represent the Twin Cities. The secretary of our association of St. Paul at the last moment was detained, owing to serious illness in the family, and was unable to come. I have not been able in the meantime to prepare anything, but the case will be laid before you so fully and so completely by Senator Sullivan that there is very little I could add, even if I wanted to.

There are one or two matters here, though, in connection with rates between the head of the lakes and the Twin Cities that I want to call your especial attention to. I will be as brief as possible. I will only cite the first-class rates. The same proportion of reduction or increase applies to all the rates, so I will give you the first class, which will mean second, third, fourth, fifth, and sixth, and you will understand that the same increase or decrease applies alike to all of them. This, I think, should have considerable bearing in connection with what Mr. Sullivan will say to you and should have considerable bearing on this whole matter.

There were times prior to 1889 when the through rate via the Lakes from New York and common points to the Twin Cities was the same as to Duluth. From 1889 to 1892 the rates to the Twin Cities were at no time more than the figures here given (referring to paper). The first-class rate was 5 to 1. In the fall of 1902 and 1904, inclusive, the Twin City rates were the following figures higher than Duluth:

First-class rate, 11 cents. In 1896 the Twin City rates were 14 cents, and in 1891——

Col. WINSLOW. Is that an increase of the rate to Minneapolis or a decrease of the rate to Duluth?

Mr. WATTROUS. That is an increase of the rate to Minneapolis.

We come down to 1907. The different dates are given. In 1907 another advance was made in the rates effective to Chicago, 62 cents; to Duluth, 68 cents; to the Twin Cities, 83 cents. You see the handicap we have had.

In 1911 the Commercial Club brought an action before the Interstate Commerce Commission against the Baltimore & Ohio Railroad et al., complaining of the rate to the Twin Cities discriminating against Duluth, asserting that the lake rates should break at the water's edge—that is, Duluth—and that the local rates from Duluth to the Twin Cities should be added to the rail rate to Duluth. You see, we were still further handicapped. The rates from Duluth to the Twin Cities, local, are governed by the western classification. There is no sixth class in the western classification. That would mean that the rail and lake rate from New York common points to the Twin Cities would be $1.03 for first class.

This statement gives those statistics all the way through and gives each as a proportionate increase. I desire to leave the statement with you and I should like very much to have you study it over.

There is one point that will be brought out very forcefully by Mr. Sullivan, but if I may be permitted just very briefly to enlarge on it before he makes the statement, I will say that the thought has occurred to me from the question that you asked Senator Nelson.

In the last four years the increase in tonnage from the head of the Lakes to the Twin Cities has been in round numbers from two and one-half to very nearly four million, which means an increase of 63 per cent, or an average of about 15 per cent a year, I think it is. Assuming that the increase would continue for the next four years, or the next six years, we will say, up to

1920, the increase would be about 120 per cent. That would mean in volume of tonnage alone, in coal, of something like 5,000,000 tons.

You spoke about the railroads hauling these commodities cheaper than the canal, or as cheap. That is, the relative cost of handling as compared with the canal. Assuming that the cost is the same, or assuming that the cost is greater, the canal would have to be used, because it will be a physical impossibility if this rate of growth continues to use the railroads entirely. There is every reason to believe that it will continue, and I think it is conservative to say that it will be greater; that the growth within the next six years will be a larger percentage than it has been in the last four years. It will take almost double the quantity of rails we have at the present time to handle it, and it is a physical impossibility, owing to the very peculiar topography of St. Paul; and Minneapolis is very little better. We can not build any more railroads. There is not a place for them to go. We have now got to turn to the river, and we are turning to it. It is our only solution. This is a problem that interests the entire Northwest. Our very salvation, almost, is at stake—our commercial supremacy.

I do not think there is anything more that I can say, and I do not want to take up any more of your time and interfere with Mr. Sullivan.

STATEMENT OF HON. GEORGE H. SULLIVAN, STATE SENATOR FROM MINNESOTA.

Senator SULLIVAN. Mr. Chairman and gentlemen of the board, in preparing to present this matter to the board of engineers of course we merely undertake to discuss the questions that were discussed in the report of the local board; and the local board's report assumed that the canal was, from an engineering standpoint, feasible in all respects. So we do not take up any questions of engineering nor do we have to take up any question relating to the prism of the canal, the size of it. We assume that the physical features of the canal were approved and that it would be a 6-foot canal, 80 feet in width at the top and 59 feet at the bottom, as provided for in the report of the local board and other reports which preceded it.

Neither do we take up the question of the type of barge, but we have undertaken to discuss the question from the standpoint of whether a barge of the character specified is or is not economically feasible; that is, whether there is tonnage enough moving between the points referred to, the Twin Cities and the cities of Duluth and Superior, which would be available to this canal and which would thereby be a saving to the public in lowered freight rates in the sum specified by the local board of engineers, to wit, $420,000 per annum. So we take up the discussion upon that basis.

First, I want to call your attention to section 31 of the report of the local board. In this section the local board says that they have the statistics of the Minnesota Railroad and Warehouse Commission of the total tonnage of hard and soft coal and flour shipped between those points during the year 1912, and that from reliable estimates furnished by railroad authorities it appears that this freight is 80 per cent of the total freight handled by the roads during that year.

In that connection it appears that the local board has undertaken to determine the question of tonnage available to this canal solely on the basis of the shipments of 1912, together with such addition to those shipments as the local board estimated would be furnished by the territory served by the canal and not served by the railways at the present time. We respectfully submit that the year 1912 ought not to be the measure, but that the measure should be an estimate of the tonnage which will be available between those points at the time when the canal may be completed in the ordinary course of the work which would be proposed six years from date.

The board accepted the railway estimate that this tonnage of coal and flour was 80 per cent of the total tonnage moving in the year 1912. That would mean that the total tonnage would be 2,722,171 tons.

We have also secured a certificate of the actual tonnage moved between the Twin Cities and the Duluth ports for the years 1909 to 1913, inclusive. You will find this table on page 15 of our statement. It appears by this statement and the facts are that the actual tonnage in 1912 was 3,484.000 tons instead of the amount necessarily found by the local board—2,722,171 tons.

This error of the local board we do not charge against the local board at all nor do we charge the local board with the responsibility for these errors

if we find any in their work. They are due to the statements made to the local board by the railways. We have the absolute fact on that proposition.

You will find in section 37 of the report of the local board that they add to the actual tonnage shipped in 1912 a certain amount to take care of the enlarged territory. Twenty and three-tenths per cent is the figure they have used. By using that figure they increased the actual tonnage which would be said to move on this canal during the year 1912 from 2,722,171 tons to 3,295,000 tons, allowing for the consumption of the territory that the canal would serve.

By adding the same per cent used by the local board to the actual shipment that we found actually did go there, we find that the actual tonnage which would be served by this canal for the year 1912 would be 4,191,000 tons. By referring to this table at page 15 we find that the actual shipment between the twin cities and Duluth and Superior have increased at the rate of more than 15 per cent per annum for five years. It is only fair to conclude that the rate of increase will continue. If it does continue until 1920, which I presume is the earliest date that we can figure for the completion of this canal, we will find a tonnage of over 9,000,000 tons to be actually hauled if there were no new factors, if you do not credit the canal with one pound of freight from the new steel mill at Duluth. That new steel mill will have as an adjunct 1,000,000 tons of cement, in addition to all the steel that it will manufacture. That, however, is its first unit. It will start with the manufacture of 1,000,000 tons of cement annually. The nearest and the best market for the cement will be St. Paul, Minneapolis, and the territory served by those cities.

It is only fair to assume that before this canal will be built that unit will probably be increased. It is only fair to assume that the linking of these waterways, the Great Lakes and the Mississippi, will furnish tonnage to this canal from various sources which will increase the tonnage over and above the 9,000,000 which we can almost prove is available to this canal. I have made computations on the basis of the actual tonnage moving in 1912—4,191,000. Dividing the tonnage as it is divided by the local board—that is, 72 per cent—using the same percentage used by the local board of 52 per cent for soft coal and 20 per cent for hard coal, and the percentages given in section 41, found on page 10 of the report of the local board, and working out the rates and all of the cost of handling, we find that by that computation, taking the figures of the local board, it will produce a saving to the public in excess of $420,000 a year. That computation is not found in the printed statement here, but it will be submitted to this board in the form of a supplemental statement, printed, so that it will be available to you in better form than it could otherwise be made available.

So we believe that as to the question of availability we have met the requirements of the local board, and we feel that we can demonstrate that this canal will be available to that tonnage, and that there will be more than three times as much available tonnage at the time of its completion as is stated by the local board. Of course, they based their estimates entirely upon 1912, and we think the estimate should be based on the year 1920, when the canal will be finished.

That brings up, of course, a question that was brought up here in this hearing heretofore, which involved the rate at which coal, flour, wheat, and other commodities will move on this canal. The local board made a comparison to obtain the rate on the Erie Canal, and they found that we could probably move merchandise on this canal at what we call the Erie rate—a rate of 3 mills per ton-mile. We believe that a comparison of the Erie Canal under the conditions that obtain on the Erie Canal during the time the comparison was made is not a favorable comparison. We believe that it is entirely unfavorable to this particular canal project; because, during the time of the Erie Canal they were using an obsolete type of boats, and the canal was falling into neglect. It did not have a uniform depth. No one could foretell the future of the canal. It appeared to be put out of business by the railway companies. The railways had control of it. They diverted all through freight from it until—there being nothing but an individual ownership of canal boats, each captain owning his own boat—there was no incentive for the man to improve the type of his boat. There was no incentive for a man to put on a canal boat of a modern type, a self-propelling canal boat. There was no handling facilities. The terminals were owned by the railroads; and so we say for those reasons that the Erie Canal rate should be very much discounted on this project.

We feel that the rates on the Erie Canal, according to the authorities we have in our pamphlet here, should not be as high as 3 mills per ton per mile, but should rather average 2 mills per ton per mile,

On page 68 of our statement we call attention to the statement of various authorities on the Erie Canal rate. Hon. A. Barton Hepburn, former Comptroller of Currency, on page 104 of "Artificial waterways and commercial advancement," publishes the average New York canal and railway rates for a 15-year period, 1893–1907, inclusive, as follows: 1893 to 1897, 2 mills; 1898 to 1902, 1.9 mills; 1903 to 1907, 2 mills.

While the railway rate during those years ran about three times that much.

In the report of the United States Bureau of Railway Economics, the Erie Canal rate is quoted as 2 mills per ton per mile. That is for the year 1911.

The United States Inland Waterways Commission, the Government report of 1908, page 238, quotes the rate varying from 1½ mills to 2½ mills per ton per mile and on an average for 10 years of 2.14 mills per ton per mile.

And so on page 70 and other pages of this report, which I will not take up your time to read because you will have them before you, the Erie Canal rate apparently is held by authorities to have been during this period about 2 mills per ton per mile.

We believe that with a canal properly constructed, with a proper type of canal boat, with proper loading and unloading facilities at each end, proper terminal facilities, so that the commodities can be handled at the very lowest charge possible with modern practice, we can make a rate on this canal of 2 mills per ton per mile, or possibly we can make a rate of 1½ mills per ton per mile.

Perhaps the largest portion of the report of the local board is taken up in a discussion of the obstacles to commerce upon this particular canal. Perhaps the greatest obstacle found by the local board consists of the question of the handling charges of goods that are transported on the canal. For instance, as to coal, they say that coal comes to the head of the lake at a very low rate—30 cents a ton from Lake Erie points; that it is unloaded upon the docks and from there to railway cars. They say that we can take coal from the lake carriers and place it upon a canal barge for about the same cost as it is now to put it upon the car at Duluth. Then they say that after we get our canal barge to St. Paul it will cost us 25 cents a ton to unload the coal and place it upon the dock, and that then it will cost 25 cents in deterioration of that coal because of the handling from the barge to the dock and railway car. Then they say it will cost us 25 cents a ton more to deliver that coal to the carload consumer.

So they charge the canal with a rate of 78 cents and 25 cents a ton for handling from the barge to the railway car or dock and 25 cents for delivery and 25 cents for deterioration of the coal; and adding those charges to the canal rate of 78 cents they find that we can transport coal at only a cost of $1.58, whereas the present rate, they say, is 90 cents a ton on coal.

Right in that connection I want to call the attention of the board to a vital and pertinent fact, which is not only of weight in the connection in which I am about to cite it, but it is important as one of the greatest factors in the industrial situation of these United States to-day. That is that since the report of the local board was made the rate on railways for transportation of soft coal has gone up from 90 cents to 96 cents a ton. That is an item that is costing us who come here before you more than $120,000 every year—that one item where they have raised the price of the transportation of coal by rail between these points since the report of the local board. But they compare it, in the local board report, with a 90-cent rate, and so they say:

"You have lost 68 cents on every ton of coal you transport, and therefore you can not transport coal."

It would be almost unnecessary to make the statement to this general board of Army engineers that coal can be transported from barge to dock by modern coal transportation methods of elevation for 3 cents a ton, because there is no respectable authority to the contrary in this country. Our statement here contains authorities from all over the country. We point out the kind and the character of the machinery by which it is done; and it is done in large quantities. The only place that we have been able to find where they have a larger charge for handling coal—something that can be said to sustain the position of the local board with respect to that—was a place in Cincinnati where they were only loading about 35,000 tons per annum. Of course, you have got to have a large tonnage in order to secure this price which the Duluth docks at the very hour the report was written were transporting coal for—from Lake Erie to their docks—3 cents a ton. That statement is contained in one of the appendices attached to the report of the local board. They are

handling coal on the Monongahela and they are handling coal at Norfolk and on the Great Lakes at prices that run as low as a quarter of a cent per ton.

Col. WINSLOW. Down at Norfolk they do not raise coal; they simply dump it into the ship, and down it goes. There is a great difference.

Senator SULLIVAN. I do not think that increases the price very much; and you would not have to load the coal excepting at Minneapolis. If the coal-handling people will put in the machinery to handle that coal we can handle it at Minneapolis for 4 or 5 cents a ton.

Col. WINSLOW. The only reason that I suggested that is that you mentioned Norfolk; and at Norfolk the cars run up and dump it into the boat.

Senator SULLIVAN. That is very true. But at this very point—and I do not intend to take up the time of this board upon that question, except to call to your attention that proposition, because all of the data is so very fully set forth in this pamphlet that I do not think it is necessary to consume the time of the board any further upon that proposition.

I want to say in the first place that I entirely disagree with the method of the local board in our handling of coal on the canal. I do not care to have them cancel off the cost of unloading their coal on the dock at Duluth with the cost of loading our coal into the barge. We prefer to charge that to the canal coal to start with, because when we get that done for from 3 to 5 cents a ton, then our coal starts out, and when it lies at the dock in St. Paul it is in identically the same situation as the coal transported by railway before it is taken off the lake carrier at Duluth. So we start under identically the same condition, except that we start with our coal with the handicap of 5 cents a ton at the very outset. The coal that is transported by rail from Duluth to-day must, every ounce of it, go through identically the same process and be elevated and taken in railroad cars and screened and shoveled and handled and sold exactly as our coal will be at St. Paul; and I do not know of one single act or one single process or one single thing that is done with coal in its transportation and marketing by way of rail to St. Paul that is not identical with what we will have to do with our coal when we get it at St. Paul.

Maj. KUTZ. Will not a lot of it be delivered direct to the consumer if it goes by rail?

Senator SULLIVAN. Some of it will be delivered direct to the consumer, to those consumers who have the side tracks. There will be a small percentage of them who will have to pay a charge of 5 cents per ton for that coal which we deliver in that manner—a switching charge of $2 a car, or 5 cents per ton. At the greatest estimate that can be made on that proposition it would not take more than half of the coal; that is, not more than one-half of the coal would be delivered in that manner. So that 5 cents a ton would be the very extreme outside cost of unloading our coal from the lake carrier to the barge. We would have to pay another 2½ cents per ton on the whole of it.

If we have a rate of 75 cents, the 3-mill rate stated by the local board, based on the accurate distance—it is only 250 miles in length instead of 260—we would have to add 7½ cents, and that would give us 82½ cents, and that would give us 13½ cents a ton on soft coal. It would cost 37½ cents a ton on soft and on hard coal, and if you will take the tonnage on hard coal and soft coal and multiply the number of tons by this rate and this specific mileage we would come within the $420,000 saving required by the local board, to say nothing about other things.

Col. BLACK. Do you think that the United States ought to contribute the entire saving?

Senator SULLIVAN. I am only meeting the statement by the local board.

Let me say one word upon that specific proposition. I believe that the waterway policy of this country has been of inestimable benefit to the country. I believe that the one hundred millions and more that have been spent on the Great Lakes have been of the utmost advantage to the people of this country. But is there a member of this board, is there any man anywhere, who will contend for the proposition that it is to the advantage of the Great Lakes alone and the fringe of cities around the Great Lakes that that benefit must come? I think not. I can demonstrate—absolutely demonstrate—to this board that the advantage of the $100,000,000 spent on the Great Lakes stops before it gets to the city of Minneapolis, on general merchandise, on sugar, on flour, on all those great commodities making up general merchandise that come by rail. That was not the case formerly. Before the year 1890 they did not go by rail; they came from the Great Lakes. They do not come that way to-day.

I want to call the attention of this board to the fact, among other things, that this report of the local board is stated by the local board to have been made upon the faith and strength of statements made to the local board, in part, at least, by Julius Barnes, of Duluth, and by Messrs. Lindly & Hall, of Superior and Duluth. Then I ask the general board to look at the testimony of Julius Barnes. He was heard by the local board at Duluth on the 15th day of January, 1913. On the 27th day of January, 1913, he was called before the Committee of the House on Merchant Marine and he made a statement and he testified before that House committee. I want to submit to this board the testimony of Mr. Barnes and his written statement, found in volume 2, pages 839–863, inclusive, as the best argument that can possibly be given by anyone in favor of the construction of this canal from Lake Superior to the Mississippi River, so as to extend to those great cities and to the great country back of them to which they are tributary and to which the products that come over the Great Lakes are naturally distributed, and see whether this canal ought not to be built so as to grant unto that great people and to the great metropolises the benefit of this $100,000,000 that has already been spent by the United States Government on that canal.

What is the difficulty? The difficulty is this: All of the boats on the Great Lakes are owned by the railways. They were not so owned before 1890, and when they were not so owned it was a free field, and the United States came along to control that interstate commerce. But the difficulty does not lie just there. The difficulty lies in this, that whereas on the Great Lakes there is, in reference to the handling of coal, iron ore, and grain, the most modern facilities known on earth for the handling of those commodities cheaply and expeditiously—Mr. Barnes testified that one elevator has a record of loading 1,125,000 bushels of grain in 10 hours. That elevator earned $12,000 that day—$1,000 an hour.

Another record of loading was 9,000 or 10,000 tons of ore in a very few minutes. I do not want to quote the time, because it might seem too short—25 minutes. But Mr. Barnes points out in that testimony conclusively that there has not been one single improvement in the transportation of goods from boat to rail or from rail to boat on the Great Lakes in 40 years; that the work is done by hand, by the old gangplank methods. Why? Because the railroads own the boats. The railroads will not put in the facilities, and no individual will put in the facilities.

Mr. Barnes came before the committee of the House and said:

"I want to propose a remedy. I want to propose a startling remedy. You can not agree with me at first, but I think the more you study the proposition the better you will agree with me."

He said that the city of Duluth is a city of only 80,000 people and can not afford to put in these facilities. We can not afford to build these docks and wharves. The railroads own our water front. We say to this general board that if we could get the benefit that Duluth has got, some little measure of the benefit of this $100,000,000 that has been spent of Uncle Sam's money on the Great Lakes by the building of this canal, we will build a terminal on the end of this canal which will permit that commerce to grow and to expand in the future, from St. Paul to the sea, so that no hostile control can touch it. Because it is the control of the terminals by the railroads that stops the waterways from getting the freight.

These handling charges we spoke of are so great that Mr. Barnes admits that if those handling charges were reduced to what they should be it would result in the saving of 20 cents per barrel upon every one of these 18,000,000 barrels shipped. Twenty cents a barrel! I believe that would go some little distance toward reducing the cost of living. That is a matter that would be absolutely and immediately stopped. That would be effected by the building of this canal. That is the proposition that we pledge ourselves to do—to put the most modern handling facilities upon both ends of this canal. The railroads will never touch it. It will go on the Great Lakes. There will be a chance then for an independent boat line, because they can transship that flour to the Erie Canal.

You see that there is coming an era when all of this railway throttling of waterways has got to stop. You see that the attention of the people of this Nation is focused upon this question of waterways because of the fact that New York is spending $130,000,000 upon the Erie Canal and the United States Government is just completing the expenditure of $375,000,000 more. Everybody knows that knows anything about the Erie Canal that it has been owned and controlled, as far as operations were concerned, by railroads. Does anybody

believe that the people of New York will permit that canal, after they have spent $130,000,000 upon it, to go into the hands of that hostile control again? That is the reason, as I understand, why New York is spending $19,000,000 for terminals; and that is the reason why the board of engineers reported to the New York Legislature that they ought to have a public traffic department for the Erie Canal. They said, "What is the use of building merely a canal? Why, suppose a railroad were to consist of nothing but two steel rails, and anybody could put a car on it?"

That is the same thing as has been the case with the Erie Canal. Any man could put a boat on it. There were no rates; every boatman made his rate by bargain. They said, "The best railroad that was ever built in the world would fail under those circumstances. What you need on a canal in this country is a traffic department."

And they cited the case of the Manchester Canal and how they have operated so successfully with a traffic department in handling the freight. You have got to have something to correlate and to unite and to coordinate units. To my mind one of the things that is responsible for the decadence of waterway traffic is just that very thing.

The Engineer Department of the United States has done its share. They have made and provided the engineers, and the United States Government has provided everything necessary in the way of improvement; but when there is a great big railroad, like the Burlington Railway, up against one man owning a steamboat it is a good deal like a battleship striking an eggshell. How in the world is one little bit of a steamship going to get up against a large corporation reaching thousands of points not reached on the waterway?

I think it is wrong to permit a railroad to cut its rates along the water and leave the other places alone—to permit higher rates to the points not touched by water and having low rates to the water points. That sort of thing has got to be cleared out of our system before waterways can be expected to develop. There is not any middle ground upon that proposition at all. What is there fair about a rate from St. Louis to St. Paul of a certain amount and just twice that much from St. Louis to Rochester because Rochester is not upon a waterway? We know that is the condition on the Mississippi River waterway.

Col. BLACK. Senator, you have been touching upon a certain course that I would like to get a little more enlightenment on. You have given us the total freight movement between Minneapolis and St. Paul and Duluth. During how many months per annum could a canal be operated?

Senator SULLIVAN. About six months.

Col. BLACK. What proportion of the total annual freight movement could be expected during that time?

Senator SULLIVAN. That depends exactly upon the proposition I have just ceased talking about. If our rate policy is going to permit a railway to undercut that canal, that is one proposition. If the railway is going to be required to make its rates upon a fair basis, why, it will affect the movement altogether. Don't you see?

Col. BLACK. No. I think there are other questions that come in there. For example, you take the coal handled. Coal could be stored without any particular deterioration, as we know. It is quite possible to move all the coal in the summer time to be used through the year if you have terminal facilities.

Senator SULLIVAN. That is very true.

Col. BLACK. On the Hudson River they have very good water facilities between Troy and New York. The cost of movement to New York by water is very much less than by rail, and the time for the movement by water is two to three days less than the time between Troy and New York by rail; but through six months of the year there is no water transportation. The railroads say to these manufacturers, if you will give me your business for the entire year your rate will be thus and so. If you will give me your business only for the winter months, your rates will be thus and so; and the water is not used.

Senator SULLIVAN. Exactly. That question is very thoroughly discussed in the report of the Merchant Marine Committee. They have enumerated, I think, about 50 towns in which that obtains, and that is one of them. They threaten to give them no service——

Col. BLACK. It is not a question of threats; it is a question of doing.

Senator SULLIVAN. On this particular canal I see no reason in the world why the coal should not all move down to St. Paul and Minneapolis during the summer months.

Col. BLACK. How about your flour?

Senator SULLIVAN. Our flour—you know, they make flour every day in the year.

Col. BLACK. I know it. That is just it.

Senator SULLIVAN. I suppose that unless the railways reduce their rates to equal the water rates, we would ship most of our flour during the summer.

Col. NEWCOMER. How about the storage? Could they stand the amount of capital tied up?

Senator SULLIVAN. Those things would accommodate themselves.

Col. BLACK. It is discussed in here, and we do not want to take up time. We are nearly an hour overtime. We want to take as little time as possible. We want only the vital facts. That is all we want.

Senator SULLIVAN. At the present time the railroads carry all the flour, because it costs, according to your local board, 22 cents to take it from the railroad and put it on the boat. But Julius Barnes's testimony is that it costs all the way from 20 to 60 cents. That is the reason it does not go that way. We would have to fix our handling charges in such a way that we could properly handle it, or of course we could only move flour during six months of the year. But I think we would move all that flour down to Lake ports during that season of the year. Of course there would have to be a storage somewhere during the six months or else the railroads would have to carry part of the flour.

Col. WINSLOW. Lake transportation is only open about six months of the year, is it not?

Senator SULLIVAN. Yes; I say that. As to the other six months during which the canal was not in operation, I say the flour would either have to be stored or would go forward by rail.

As to what policy the railroads would adopt there, I can not say. They might adopt a rate—of course, you know, they can not change their rate; they can not raise their rate. They have to maintain a rate if they once put in a rate. They can not raise them merely upon the ground of water competition. So that would be largely a question of what policy the railroads would undertake; and I suppose they would undertake to have the most usual policy. If they did, why the amount of flour that would be stored up in Minneapolis and other points—Duluth, for instance—waiting for the summer movement would grow greater, and the proportion sent by rail would grow less until perhaps there might be some arrangement worked out of it whereby we would carry 60 or 80 or 90 per cent of it.

That is a pretty hard question to answer, Mr. Chairman. I have just given you my best notion about it. I think perhaps the general board are more competent to figure that out than any of us. Are there any other questions, Mr. Chairman?

Col. BLACK. No; I think not.

Senator SULLIVAN. I want to call your attention again to this matter of the lake and rail rate. Mr. Wattrous called the board's attention to it. I want to call the board's attention to it because of its corroborating the statements made by Mr. Barnes.

What is, first, the known history of Great Lakes transportation? The finding of this committee sets forth the situation very fully, and it is referred to in our pamphlet; but in reference to the lake and rail rate between New York and the Twin Cities, there was a time prior to 1889 when that lake and rail rate was the same to the Twin Cities as to Duluth. Then the history is that that rate, lake and rail, has been increasing year by year from 1890 to the present time. In 1892 it was 11 cents, and it went up to 14 cents in 1896, and then from 1897 to 1901, and successively it has advanced until the differential between Duluth and the Twin Cities has run from 16 to 21 cents. But during all of that time the point I want to make is that the raises were occasioned not by raising rail rates but by raising the water rate, and the raising has continued every year since that time, when it is found by this Committee on Merchant Marine that the Great Lakes transportation has been controlled and owned by the railways.

So we say that by this insidious process the railways, by owning the boat lines and by refusing to put in terminal facilities, have robbed us of the benefits which we would otherwise get from the $100,000,000 that has already been spent by Uncle Sam on these waterways. If there were no other reason why this board, it seems to me, should undertake a final survey of this canal, I think it should so undertake it as a notice to the railways that that sort of a practice can not be longer tolerated.

Col. BLACK. There is one other thing I want to invite your attention to. I suppose you saw that minority report of Senator Burton on the present rivers and harbors bill?

Senator SULLIVAN. No, sir. My attention was not called to that.

Col. BLACK. When you see it you will see that where an improvement is shown to be mainly or largely for the benefit of a community, Congress, in many cases, deems it wise that a proportionate share of the expenses of the improvement should be borne by that community. That is cooperation, and in many cases that has been insisted upon by Congress. I only want to invite your attention to it, because in this case there is, as I understand, no offer whatever of local cooperation excepting that made this morning.

Senator SULLIVAN. I call the attention of the board to this—it is the language of our statement:

"Finally, we desire to add that the report of the local board should not be concurred in, but the same should be modified or set aside and the project recommended as commercially feasible. That if the general board shall deem it advisable to recommend the proposed canal upon condition that the localities and States interested provide proper terminals and proper facilities open to all upon equal terms, subject to public control and free from railway or other monopolistic control so as to insure such fair treatment of canal commerce as may be within the power of the States and localities interested, such conditions will be cheerfully accepted and complied with."

Col. BLACK. That is required by law now.

Senator SULLIVAN (continuing reading). "In consideration of this project, if the general board should find there are any other conditions subject to which the project can be recommended, such conditions will be accepted and performed by the States or localities interested, if possible."

Of course, that is a very general statement. I do not know whether that is the first proffer—the proposition that the locality should pay part of the cost.

Col. BLACK. Oh, no; that has been insisted upon by Congress in a great many cases.

Senator SULLIVAN. I am free to say that I believe the locality is interested; that is, the States of Minnesota and Wisconsin would make a very strenuous endeavor to meet the conditions of that character that might be thought proper to be imposed. Of course, as said by Senator Nelson this morning, and Congressman Stevens, there are difficulties in this proposition that are not always found in others. It is almost wholly an interstate proposition. It is an improvement of the boundary line until you get away beyond Taylors Falls, and then there is one portion that runs across the northwestern part of the State of Wisconsin and runs through to the Great Lakes. Of course, so far as that portion of this waterway that runs between Prescott and the Minnesota-Wisconsin boundary line is concerned, where the St. Croix turns to the right on that boundary line, that is practically a continuation of the St. Croix River. It has already been approved, and that part lying between Minneapolis and Prescott has already been very largely improved by the Government. As I said, I have no doubt that the benefits that this territory would receive would be so large that there ought to be and there undoubtedly would be a cooperation in the matter of cost. I do not think there is any question about that.

Col. BLACK. That is all I wanted to ask you.

Senator SULLIVAN. As I understand it, the report of the board is necessary upon this project in order to release an appropriation that has already been made, if I understand it correctly, for the final survey; and I know that individual citizens of Minnesota are interested enough in the project so that I think if the board deemed it wise to make this final survey they would contribute quite a large sum toward the cost of so doing.

Col. BLACK. In many cases those final surveys have been ordered, Senator, only after the offer of local cooperation in the final cost have been made. That has been a factor in very many instances in recommending the survey, even.

Senator SULLIVAN. We would not only be willing to cooperate in the cost of the project, but I believe that we would be willing to bear a part of the expense of the final survey.

No other questions occur to me to be discussed here, unless there are further questions on the part of the general board. So far as the type of barge is concerned, we have offers from the man who designed the barges for the Alabama and Mobile——

Col. BLACK. They could not run through this canal.

Senator SULLIVAN. No; but he has taken the question up, and he has figured on a type of barge for this canal which, he says, would hold 500 to 600 tons. He says that he will guarantee that we can haul coal at 25 cents a ton.

Col. BLACK. There have been a great many statements made that have not been proved yet. So we have to take his guarantee with a grain of salt. What is the size of that 500-ton barge?

Senator SULLIVAN. He did not give the dimensions of it.

Col. BLACK. That is of vital importance.

Senator SULLIVAN. This is the same man who was sending a man to St. Paul——

Col. BLACK. Those barges are good, but they have not done entirely what they wanted them to. They are beginning to, but they have not yet.

Senator SULLIVAN. He got his cost down for handling coal to 3 cents.

Col. BLACK. Has he carried any coal yet?

Senator SULLIVAN. Yes. According to his statement here—I have his statement with me, in the Engineering News——

Col. BLACK. We have that here on file.

Senator SULLIVAN. And I have quoted some from his letter. I notice, also, a very enlightening thing and a very refreshing thing that happened the other day. As I understand it, the Interstate Commerce Commission refused to grant an application by a railway to be permitted to make lower rates between Pittsburgh and Memphis on lumber without cutting the rates to points between. That authority was denied. And so I think that the signs of the coming of the dawn of the new era when waterways will be given a little chance for life is at hand, and the railways will be compelled to live upon freight which will render compensatory rates.

As I understand it, in Germany and France they do not allow a railway to undercut a waterway rate. They give a differential below which the railway company can not go.

I do not see any reason—of course, that is not within the jurisdiction of this board—but I can not understand any reason on earth why any law will permit a railway company to haul freight to any points in the world at lower than the cost of transportation, and then permit that railway company to charge a higher rate to other places, so that its total returns will be adequate to pay the investment made by the owners of its securities.

Col. BLACK. You noticed how Senator Nelson this morning did not answer my question on that point?

Senator SULLIVAN. I do not know. I would like to have pinned him down on that a little bit, myself; but I know my answer on that proposition is that it is a discrimination of the most violent kind.

Gentlemen, I do not want to bore you and take up your time. I have some notions about these things. I want to file a supplementary statement, because I find that in looking over this statement I was somewhat in error on some propositions—that is, I was in error as to exactly what was in the mind of the local board. It would appear in the statement of the local board that, for instance, the rail transportation of wheat included the elevation charges, but that does not mean that the man who transports wheat from St. Paul has got to pay his own elevation charges at Minneapolis and Duluth. Those elevator charges are no greater for one than the other, except in the case of the canal, and he would have perhaps to pay the cost of transferring from the elevator to the barge, unless the grain was already in the elevator. If the grain came in in a car that could go through without taking the wheat out and putting it into elevator, there would be an advantage to the railway transportation in that one elevator charge, but wherever wheat arrives at Duluth to be transferred——

Col. ABBOT. Pardon me, but is not wheat generally carried out of the car and after having gone some distance put into the elevator for handling?

Senator SULLIVAN. Yes, sir; as I understand the grain business you have struck a very vital point. Grain comes into the country elevator, and it is not cleaned and it is not cooled and it has nothing to do with it. It is sent finally to the great terminal elevators, and there it is cleaned and treated.

I was a member of the grain investigating committee of the Senate at the last session, and we had that very proposition up. The grain that comes into Minneapolis necessarily is in an elevator. The elevator charge is a fixed charge, and if you put your wheat into the elevator and simply let it run out into another car, your charge is the same as if you had 10 days' storage and go through all this process of cleaning. So I do not think the canal wheat

ought to be charged, except on a very small percentage of the wheat going toward Duluth, with any other charge than the difference between the transportation by canal and the transportation by railway.

If the board will permit me, I will file with the board later a printed statement supplementary to the one that has been filed, including data which has come to our hands since the printing of the statement.

Col. BLACK. Very well.

Col. NEWCOMER. When may we expect that, Senator?

Senator SULLIVAN. I think I can have that here inside of two or three weeks. Is that time enough?

Col. NEWCOMER. Oh, yes. You may suit yourself about that, largely.

Senator SULLIVAN. There have been some changes of rates and other conditions which I want to call the attention of the board to in the supplemental statement, and one of these statements is a very important one. It is on flour. One dollar and sixteen cents is the rate for the shipment of flour east of Duluth. The discussion in the local board's statement hangs upon the theory that it is $1; and there are other vital questions of that character that I think ought to be taken into consideration by the board. And perhaps I can add to that supplemental statement a more particular statement of our position with reference to cooperation in the matter.

I want to thank the members of the board for your kind attention to me during my long talk this morning.

Col. BLACK. We have been very glad to have you here.

STATEMENT OF MR. F. N. STACY, STATISTICIAN OF THE MINNESOTA COMMISSION.

Mr. STACY. I should like to get at the points upon which your board desires data. I judge by your questions this morning that you desire, first, data in regard to tonnage during the summer months of lake navigation?

Col. BLACK. Yes. Those totals are not for annual movements. We want to know how much can be expected in the summer months.

Mr. STACY. In regard to flour and grain and coal, and so on?

Col. BLACK. Yes.

Mr. STACY. And, second, you want further data on the benefits locally and generally; and third, you would like further data on the subject of the barge type and capacity for a 6-foot canal?

Col. BLACK. Yes.

Mr. STACY. And, fourth, do you require any further data on the subject of transportation cost and handling cost on such products, or have you sufficient?

Col. BLACK. I can not say. I have not studied it enough.

Col. NEWCOMER. The board has not yet gone over this carefully, so they can not tell about that.

Mr. STACY. Fifth, I suppose you would like data in regard to methods and practices with reference to rail shipment as compared to water shipment. I suppose that whatever data you could get on that would be acceptable?

Col. BLACK. I do not think you could get any that is not at our disposal now. It would be merely speculative in this case.

Mr. STACY. Our data so far simply comes down to the year 1912. We could carry it forward, I suppose, to the close of 1913 if it is desired by this board.

If there are any other points desired, I would like to hear from the board.

Col. BLACK. These offers of cooperation have been very general, and I only want to bring to the attention of you gentlemen that the question of cooperation has come in many cases previously that would not otherwise have been recommended if it had not been for offers of local cooperation.

Senator SULLIVAN. I came here to represent the State of Minnesota and its commission, and the State of Wisconsin and its commission. The Wisconsin commission are present, but represented by me so far as any statement is to be made. And I also represent the commercial bodies of Minneapolis and St. Paul.

STATEMENT OF HON. C. R. DAVIS, REPRESENTATIVE FROM THE THIRD CONGRESSIONAL DISTRICT OF MINNESOTA.

Mr. DAVIS. Mr. Chairman and gentlemen, I will not detain you to exceed two or three minutes. I could not, if I desired to do so, put any statistics before you that would be of any more value to the board than the statement made by Senator Sullivan.

I represent the district in which the Minnesota Valley, the heart of Minnesota, is contained, surrounding the Twin Cities, taking in a portion of St. Paul, extending to Washington County, to the east of St. Paul and Minneapolis and surrounding Minneapolis.

I have lived in Minnesota—I was going to say, longer than anybody. I was there before it became a State. I have seen the navigation by the so-called Minnesota River, which furnishes some of the water for the Mississippi. I am at the junction. I am a waterway advocate. My terms in Congress for 12 years have demonstrated, however, this fact, that the money expended heretofore upon waterway projects, at least a great deal of it, has been uselessly expended, I believe.

I agree to a large extent with Senator Burton. In all matters of this kind, however, I think the engineering board, while they are perhaps limited to exact statements as to what ought to prevail, yet I believe this board is endowed with a little of the same discretionary power that courts are; and upon that point I wish to say a few words.

You know that certain rivers, like the Tombigbee and others, have been provided for with reference to future tonnage, etc. This is the only vital connecting link between the Great Lakes and the Gulf.

I heard your cross-examination of Senator Nelson, whom I have known ever since he came to Minnesota, and I wish you could have continued further. I wish to say this, that even if this board could not at the present time figure out a good substantial dividend on behalf of this waterway project, still it is as it were the beginning of a system of waterways which, in my judgment, is the all-important one, down the great Mississippi Valley, 1,500 or 2,000 miles from the Gulf to the Lakes, and about 1,500 between the Alleghenies and the Rockies, containing the heart and center of this continent from a productive standpoint and a standpoint of policy; and were I an engineer I should figure on the country that is tributary to this main artery, this main canal which ultimately will almost belittle the great Panama Canal, and the building of this canal should be the hope of the engineering board from this time forth. This productive part of our continent should be encouraged, even if temporarily for the next two, four, or six years it should not be a paying proposition.

The head of the Great Lakes at Duluth, for instance, should be the starting point, even if the St. Croix River and the canal should not in the first four or five years pay. There should be a good beginning for this ultimate grand ending, for the heart and center of this continent.

I ascertained from the figures submitted this morning that perhaps it will not pay quite 3 or 4 per cent, but my experience is that while you can not figure immediately any actual percentage, ultimately and within a few years it is going to pay a large percentage. It is not wholly for the States of Minnesota and Wisconsin; it is for the entire great Northwest, the great wheat-producing country, the great Mesabi Range, the great steel works that are about to be developed and will be soon developed; for the coal, lumber, iron, grain, etc., that are produced in that great territory.

I will state that every place that you put in a canal, and especially of this kind, you are bound to reduce freight rates and thus inure to the benefit of the whole country.

My point is that you ought not, in my judgment, to figure down to the last cent of percentage that will be made immediately upon the construction of this canal, because the increase is so great that ultimately, and very soon, you will reap the benefit many fold, even if you can not see it for the next four or five years. That is the point I desire to leave with you.

Having lived there almost 60 years, right in the heart of this country, and knowing the conditions, I think that that canal will be of very great benefit not only to that territory but the country at large.

I thank you, gentlemen, for your attention.

Senator SULLIVAN. There was a mistaken impression. Our figures show absolutely that we will realize more than 3½ per cent on the investment and cost of maintenance from the very day it is constructed. Our figures show that merchandise can be hauled at rates so much less that 3½ per cent will be saved and the low cost of operation required by and asked for by this board will be realized.

I simply wish to say that if the board can find its way clear to recommend it on the broad proposition, and owing to our location, it ought to prevail. The board ought to give us the benefit, and the absolute benefit, under those cir-

cumstances. I think this project should receive as much meritorious attention as any project I have ever heard of in 12 years—in all my river and harbor work.

Col. BLACK. Gentlemen, we are very much obliged to you.

STATEMENT OF MR. JAMES L. COWLES, PRESIDENT AND TREASURER OF THE WORLD POSTAL LEAGUE.

Mr. COWLES. Are you closing your hearing at this present time?

Col. BLACK. We should have closed the hearing on this subject at 11.30. There are some other gentlemen present who wish to address us on other subjects.

Mr. COWLES. I want to present some different views, if you please. Do you prefer that I should do that later?

Col. BLACK. No; we would rather go ahead now.

Mr. COWLES. I am from the State of New York, and I have devoted about 24 years to the study of transportation problems in this country. I want to say a word in reference to the Erie Canal. When this new barge business was up I gave considerable study to it, myself, and I remember very well the articles published in the Railway Gazette by one of the leading engineers of this country, I think, of the Troy Polytechnic Institute. I can not remember his name.

Col. ABBOT. Was it Mr. Sweet?

Mr. COWLES. I think not; but the article was in the Railway Gazette of that time, in which he showed that the business could be done more cheaply by rail than by the canal. The whole trouble is this: We have got our railways, but if I had my ideas carried out, if we were going to have another route it would have been to spend the money on an electric railway that would run every day in the year, and I would have had that railway run by electricity furnished by water from Niagara Falls or something of that kind.

Gentlemen, to my mind, we must realize that the railways, trolley lines, auto and air lines, steamboat and steamship lines, telegraph and telephone lines are the nervous system of the body politic, and the solution of this problem is to be worked out through Government ownership of all of these great businesses and in no other way.

I believe that we are going to lose $100,000,000 on the canal in New York. For half a year, very nearly, it will not be of any use to us whatever. The stuff that goes out of the canal has to be brought there by rail to it, and then taken by rail from it; and if the Government owned the transportation routes and ran them you would do that business at less money, I believe, than could ever be done by private parties. We have expended and wasted enormous amounts of money upon this business. Samuel Fowler, one of the efficient engineers of New York, testified not long ago that in the mere matter of improved terminal facilities the cost would be cut from 75 cents to 19 cents a ton; and Mr. Fowler estimated that the cost by rail for the average of 135 miles was only 40 cents.

I desire to leave with you this little bit of a pamphlet which will bring out some of those points. It says that on the carload freight, 60 per cent of all freight, handling ore on the Great Lakes, if the whole railroad business were handled by the Government, could be done for 44 cents a ton. Substituting mechanical appliances for man power, the terminal expenses would be only 19 cents, and whole total cost would be 59 cents a ton.

In the first place, you must bear in mind that every competitive effort is a waste of business energy if that business can be done by one line running from Duluth to the cities of Minneapolis and St. Paul. You are going to build another line, and that is just so much labor lost.

Cooperation is the law of human advancement. We have been wasting and wasting all these years by this whole system of competition.

The trouble with our railways is that they never make their rates according to the cost of the service, but on the basis of how much the traffic will bear. Always and forever that has been their policy. Bring all these railways together. Use the trolley lines wherever they will do the business best; use the steamboats and the steamships where they will serve best.

Mr. SMALL. If I may interrupt the gentleman, I would like to say that the allotted time has passed.

Col. BLACK. I am afraid it has, sir.

Mr. COWLES. I will not take more than one minute more.

So far as coal is concerned, you know and I know that the time is close at hand when there will not be a pound of coal handled by railroads. It will be transported by electricity and carried by electricity to the place where it is to be used, and the savings made in the by-products of coal will far more than pay the expenses.

The thing we want to-day is Government ownership of these things and of all means of transportation, and that will enable us to handle these things at infinitely less cost than in any other way.

It is but a waste, to my mind, to build canals that can only be used for one-half of the year, when you can put in good electric service at infinitely less cost.

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